INDIA
RUBBER WORLD

OUR
60th YEAR

A BILL BROTHERS PUBLICATION

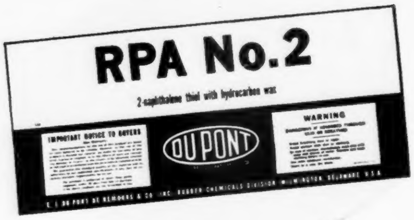
AUGUST, 1949

With DU PONT RPA's you can

Reduce breakdown time
Improve processability
Cut power consumption

RPA #2
SOLID FORM

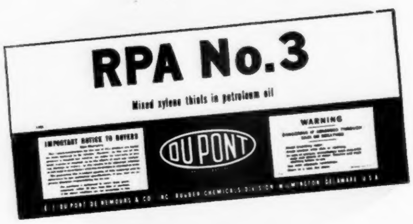
For natural rubber and reclaim
Supplied in the form of waxy flakes, it is especially suited to open mill breakdown of natural rubber. Its use materially reduces the time and power required for breakdown. From 0.15 to 0.50 part per 100 parts of rubber is recommended, depending on the time and temperature of milling. RPA No. 2 also aids in producing smooth-processing reclaim stocks . . . is effective for reducing the viscosity of rubber cements.



RPA #3
LIQUID FORM

For natural rubber and reclaim
Preferred for peptizing natural rubber in a Banbury or plasticator because of its liquid form. With this peptizer, it is often possible to eliminate the second pass usually required when plasticating by mechanical means alone. The recommended amounts are the same as for RPA No. 2. It also helps produce smooth-processing reclaim stocks and aids in reducing the viscosity of rubber cements.

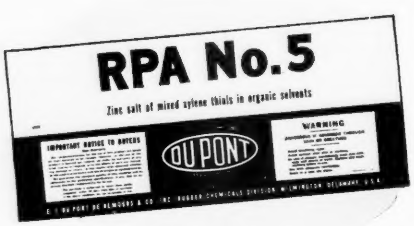
In "low temperature" GR-S, RPA No. 3 markedly improves processability . . . results in lower processing temperatures, less scorching, smoother extrusions. Concentrations of 1.0 part or more are generally recommended. Equally effective in the above applications is RPA No. 3 RO, a reodorized material.



RPA #5
LIQUID FORM

For GR-S—Especially developed for breaking down GR-S. Its use effectively reduces breakdown time and power consumption . . . helps produce smoother processing stocks with reduced nerve and shrinkage. From 0.5 to 2.0 per cent RPA No. 5 is recommended for breakdown at high temperatures on a mill, or in a Banbury or plasticator.

For sample and additional information on Du Pont Rubber Peptizing Agents, write: E. I. du Pont de Nemours & Company (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.



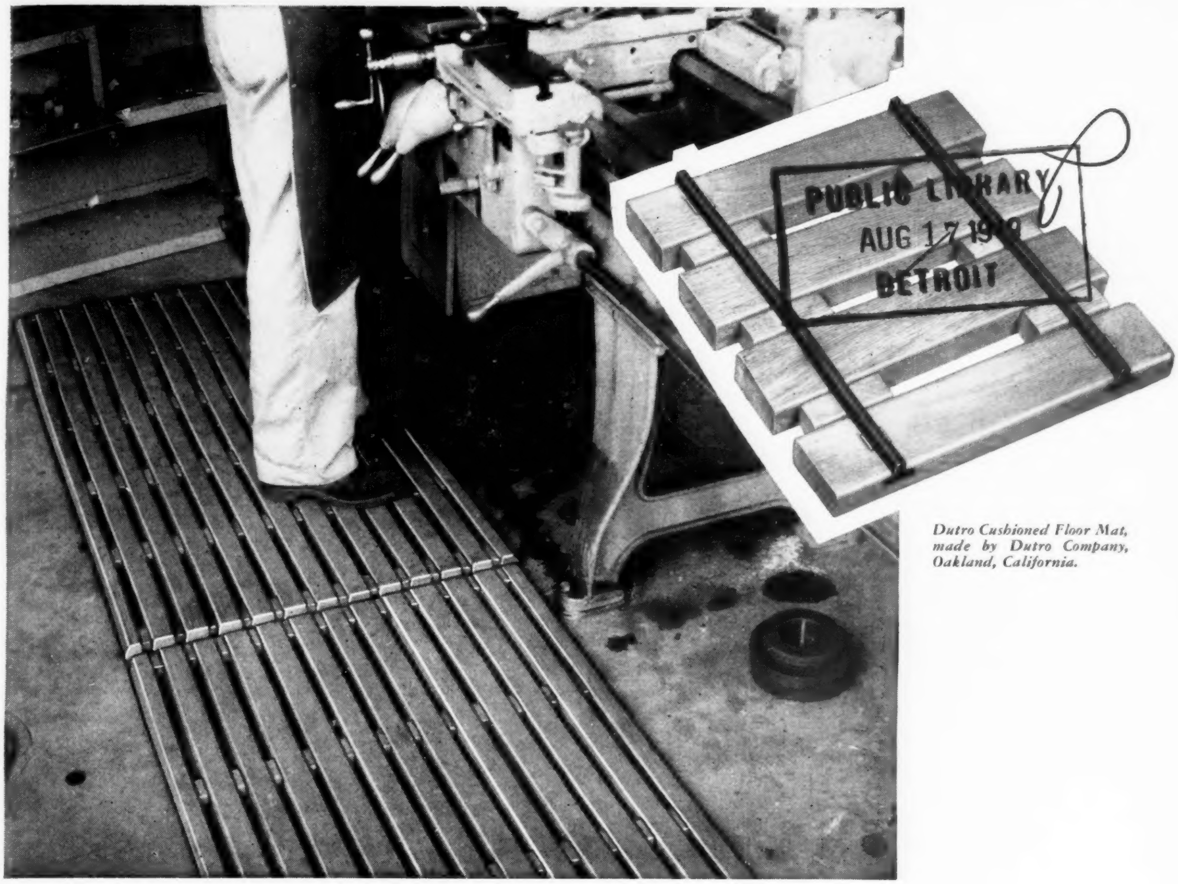
DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.),
Wilmington 98, Delaware

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

INDIA RUBBER WORLD, August, 1949, Vol. 120, No. 5. Published Monthly by BILL BROTHERS PUBLISHING CORP., Office of Publication, Orange, Conn., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Orange, Conn., under the act of ... Subscription United States and Mexico, $3.00 per Year; Canada, $4.00; All Other Countries $5.00; Single Copies 35 Cents. Address Mail to New York Office.



Dutro Cushioned Floor Mat, made by Dutro Company, Oakland, California.

It puts a cushion under foot—lowers expense too!

THESE floor mats used to lead a rough, and often a short life. The rubber binding strips on the underside wouldn't stand up under hard usage—as well as the effects of oil, grease or acid.

The makers of Dutro Cushioned Floor Mats, after tests of many rubber compounds, found that Hycar American rubber not only solved the problems, but gave them *extra* advantages.

For example, mats have been in use for three years and Hycar is still doing a first-rate job! It acts as a resilient cushion—helping reduce worker fatigue. Mats do not come apart or stretch out of shape. They protect dropped tools and parts.

These floor cushions are paying for themselves many times over in machine shops, canneries, restaurants, locker rooms and other "problem spots" where service conditions are severe.

Hycar American rubber set the pace here, as it has in so many other products, because of its versatility. It resists heat and cold, weather and wear. It's light in weight, has high tensile strength, is highly resilient. It's oil-resistant—gas-resistant. Compounds can be varied from extremely soft to bone hard, and can be made in many colors.

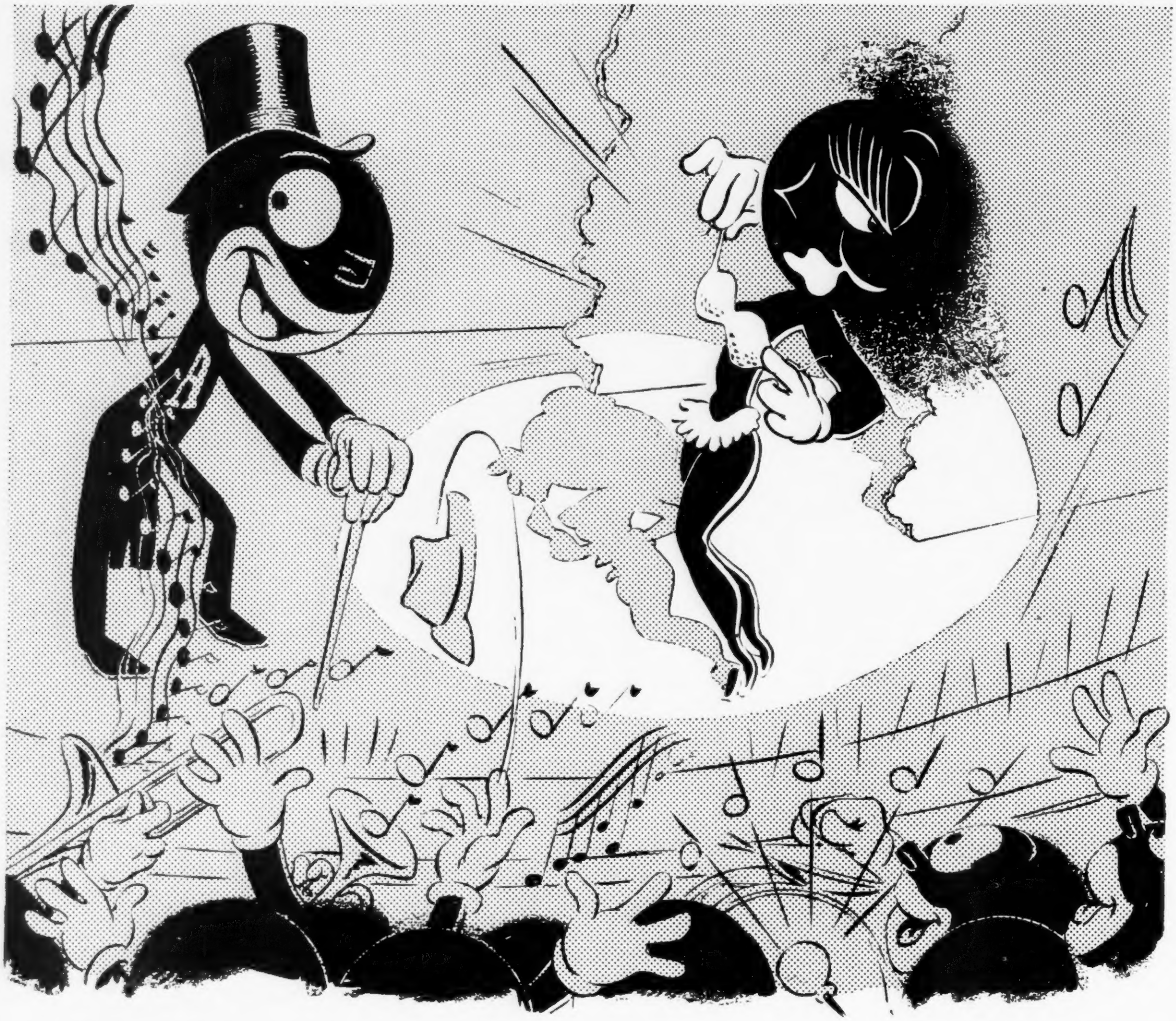
Besides being a base material, Hycar may be used as a plasticizer . . . as a modifier for phenolic resins . . . as an adhesive . . . as a latex for coating or impregnating.

Hycar is used in practically every field, in dozens of ways. Perhaps it may answer your problem—improving a product or developing a new one. For complete information and helpful service, please write Dept. HA-8, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar Reg. U.S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers



Preview of Coming Events

MONEX NAUGETS

First in the line of Naugatuck Rubber Chemicals to be offered in the new improved Nauget or Pellet form.

- **NAUGETS ARE DUSTLESS**

  A boon to the operators who must weigh, or mix Monex. Even after crushing, dust is not formed—just smaller Naugets.

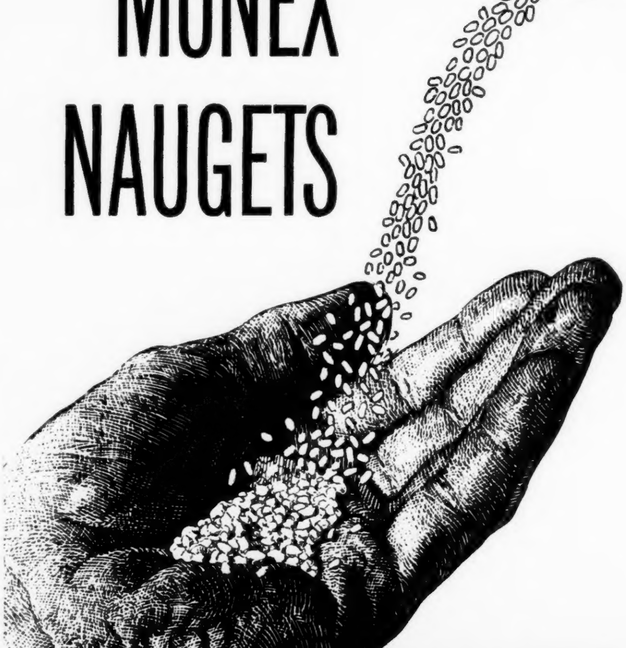
- **NAUGETS FLOW FREELY**

  Weighing is made easier and there is no loss from incomplete transfer to the mixer.

- **NAUGETS DISPERSE RAPIDLY**

  In repeated mill tests, Naugets disperse faster than the old powder form. Mixing times can be reduced—and still with no objectionable dust.

PROCESS · ACCELERATE · PROTECT
with NAUGATUCK CHEMICALS



Naugatuck Chemical

Division of United States Rubber Company

NAUGATUCK, CONNECTICUT

In Canada, Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ont.

..in the rubber industry... get these THERMALL *Profit Builders!!*

Increase Banbury output, save labor and power costs.

Shorten breakdown time on mills, save labor and power costs.

Improve compounding quality.

Improve molding quality and reduce curing defects.

Increase capacity of mixing on open mill by heating crude rubber and reclaimed rubber.

Cut curing time up to 50% and more.

Increase equipment life, reduce maintenance costs.

Break down ***Hard Stocks*** easier, faster, save labor and power costs.

Thermall equipment is extremely economical to operate.

Thermall Electronic Heating equipment generates heat right where it is wanted, ***"in the material itself"***.

Thermall equipment will speed up checking materials in laboratory, such as mixed stock, checking for proper dispersion of pigments in rubber . . . checking of cord fabrics for moisture content . . . and all other types of materials.

SEE *THERMALL* DEMONSTRATED IN YOUR OWN PLANT WITHOUT OBLIGATION

THERMALL

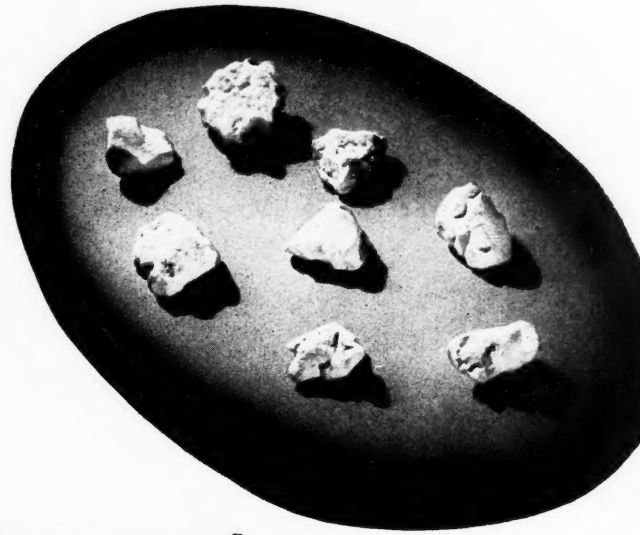
ELECTRONIC RUBBER HEATING

For full information on the advantages and uses and for demonstration, write . . . .

W. T. LaROSE & ASSOCIATES, INC.

TROY, NEW YORK, U. S. A.

GUARANTEED PERFORMANCE . . . *or it doesn't cost you a cent!*



THESE CALENDERS WERE designed to plug holes IN PROCESSING EFFICIENCY

Farrel-Birmingham has maintained close contact with rubber and plastics processors since the earliest days of these two industries. The intimate knowledge gained through these relationships, combined with continuous technical research, has enabled the company to develop products which have kept pace with, or even anticipated, the changing needs of these industries.

The four calenders illustrated here are good examples of this pioneering policy. Each was designed to fill a real need—to plug a hole in processing efficiency.

Write for further information about calenders or any of the other equipment listed.

A 24" x 48" three-roll calender designed with substantial proportions and ample weight to withstand the severe service encountered in calendering stiff mechanical goods stocks. Housings, journal boxes and other parts are the same as would ordinarily be used for a 24" x 68" calender. Housings are of the arch type, of heavy box section, made of Meehanite* metal, a processed cast iron of superior physical properties.

B Designed for production that demands extremely accurate gauge and temperature control, the Farrel-Birmingham Z-type calender has a number of outstanding advantages: (1) Vertical pressure from a third roll cannot affect roll settings; (2) exposure of material in initial passes limited to a 90° arc of roll surface; (3) positive roll positioning provided by hydraulic pullbacks; (4) a built-in device which provides means for crossing the roll axes to compensate for deflection.

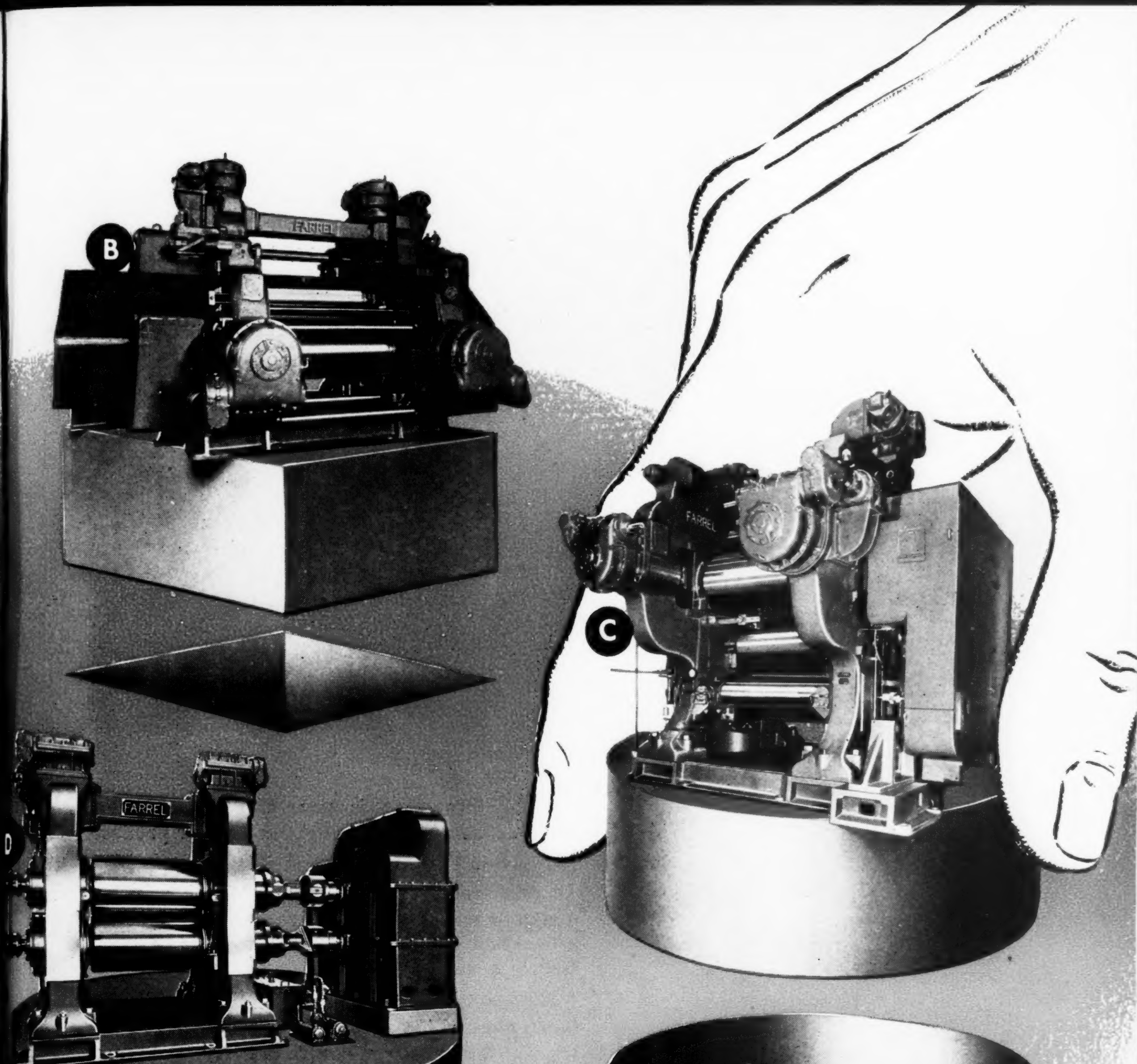
C In this four-roll plastics calender adjustment of the top, bottom and side rolls is by separate motor driving each screw through high ratio reduction worm gear units. Control is by push button; either end of a roll may be adjusted separately or both ends together. Opposite the bottom roll is a forged steel embossing roll equipped with air cylinders, valves and piping to provide pressure against the bottom roll.

D This 30" x 54" two-roll calender is specially designed for processing asphalt tile, with a variable speed range from 12 to 100 feet per minute, with even motion or friction between the rolls as desired. Adjustment of the top roll is motor-operated, with push-button control for adjusting either roll end independently or both together. A feature of this calender is the unit containing the drive and connecting gears, which are enclosed in a separate, fabricated steel housing. Rolls are connected to the gear stand by heavy, smooth-operating universals.

F-B* PRODUCTION UNITS

- Banbury Mixers
- Plasticators
- Pelletizers
- Mixing, Grinding, Warming and Sheeting Mills
- Bale Cutters
- Tubing Machines
- Refiners
- Crackers
- Washers
- Calenders
- Hose Machines
- Hydraulic Presses
- And Other Equipment for Processing Rubber and Plastic Materials

** Registered Trade-marks*


B
C
D
FARREL
FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Houston
Farrel-Birmingham*

Pick your package—

PLIOLITE S-6 comes the way you want it

As one more service to its customers — Goodyear supplies **Pliolite S-6** in a choice of easily-handled packages. **Pliolite S-6** comes in 200-pound drums or in 50-pound bags, so you can request this use-proved copolymer in whichever container best meets your handling facilities.

Either way you order, you'll find **Pliolite S-6** can be easily dispersed in the Banbury or on the mill. Or if you wish you can have **Pliolite S-6** *as masterbatch* — a thorough dispersion of the resin in rubber, packed in 200-pound cartons.

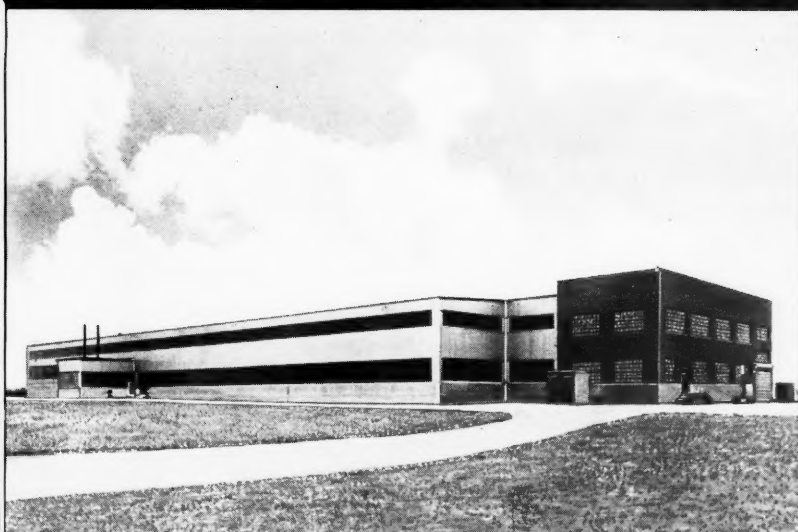
Regardless of the form of **Pliolite S-6** you order, when you include it in your gum, black or non-black loaded stocks, this copolymer resin will improve tensile, tear, hardness, stiffness, flex-life and abrasion resistance. Whenever you want a low-gravity, light-colored stock of high strength and easy processability, you can use **Pliolite S-6** with confidence. For details and sample, write:

GOODYEAR, CHEMICAL DIVISION
AKRON 16, OHIO

USE PROVED Products

GOODYEAR

Pliolite—T.M. The Goodyear Tire & Rubber Company



Welcome music
to consumers of Zinc Oxide

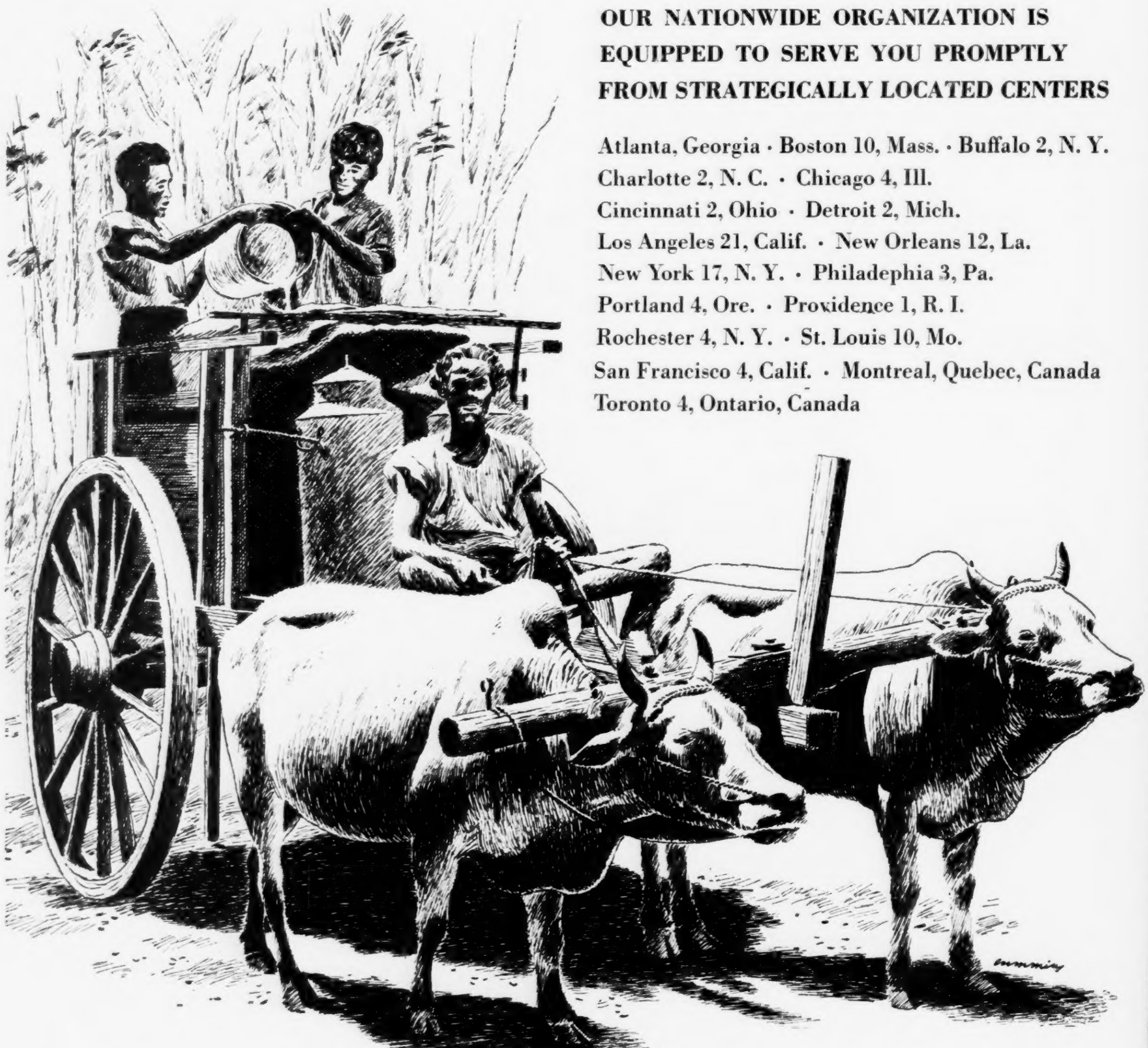
Zinc Oxide is a vitally important constituent of many products — but chiefly in rubber, paints, ceramics and floor coverings. While manufacturers in these fields may require pigments having different characteristics to meet their individual needs, uniform high quality is, and always has been, the most essential consideration.

The St. Joe Electro-Thermic method of zinc oxide production is a comparatively recent improvement of the direct-from-ore, or American Process. The flexibility of our Electro-Thermic method first of all makes it possible to produce the grades desired by the various consuming industries. The ease of control of the process furthermore ensures that the pigment in each bag possesses precisely those chemical and physical characteristics which its end-use indicates as being desirable and — most important of all—that these desirable characteristics are rigidly maintained on all succeeding shipments. *That is uniform high quality as defined by the St. Joseph Lead Company.*

uniform Quality

ST. JOE | Lead-Free | **ZINC OXIDE**

ST. JOSEPH LEAD COMPANY • 250 PARK AVENUE, New York 17, N. Y.
PLANT & LABORATORY: MONACA (JOSEPHTOWN) PENNSYLVANIA



RLD

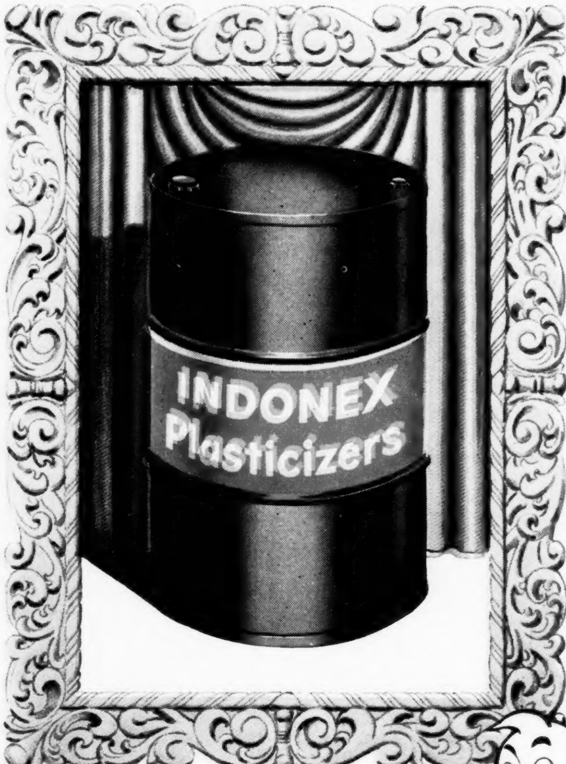
CARBON BLACKS

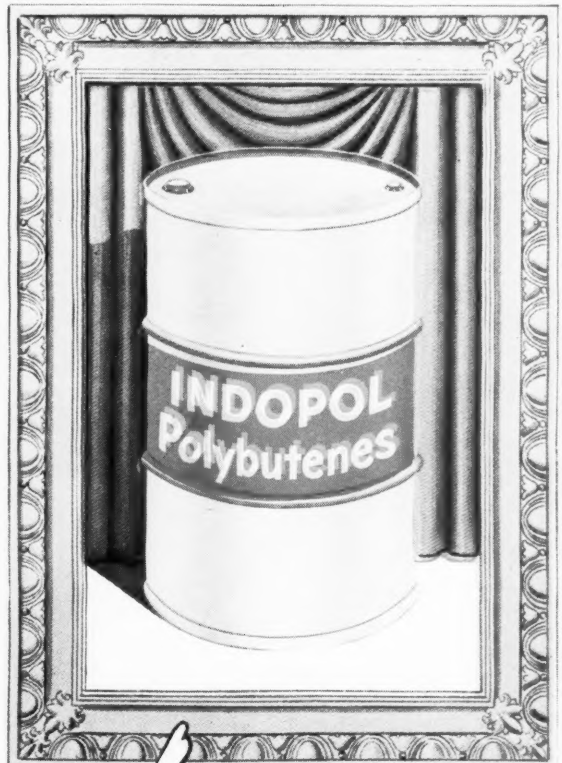
UNITED CARBON COMPANY, INC.

CHARLESTON 27, W. VA.

NEW YORK • AKRON • CHICAGO • BOSTON

Both worth looking at–





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For Rubber, Synthetic Rubber, Asphaltic, and Resinous Compositions

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INDOPOL POLYBUTENES

For Rubber Goods, Adhesives, Mastics, Paper Products, and Tape.

Bulletin 12

INDOIL CHEMICAL COMPANY

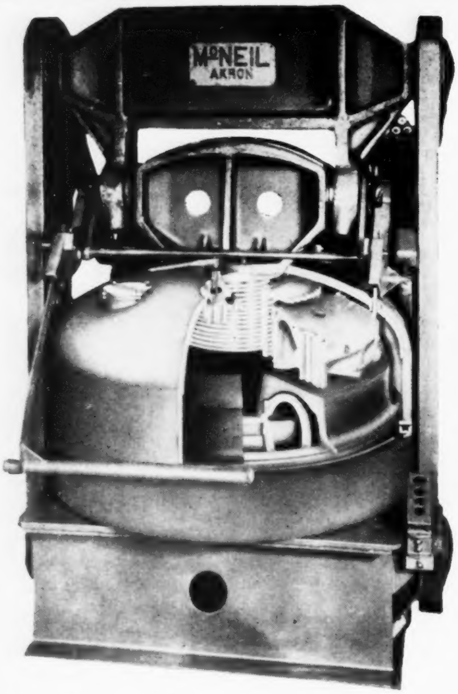
910 SO. MICHIGAN AVENUE • CHICAGO, ILLINOIS

INDOIL®
CHEMICAL PRODUCTS

McNEIL

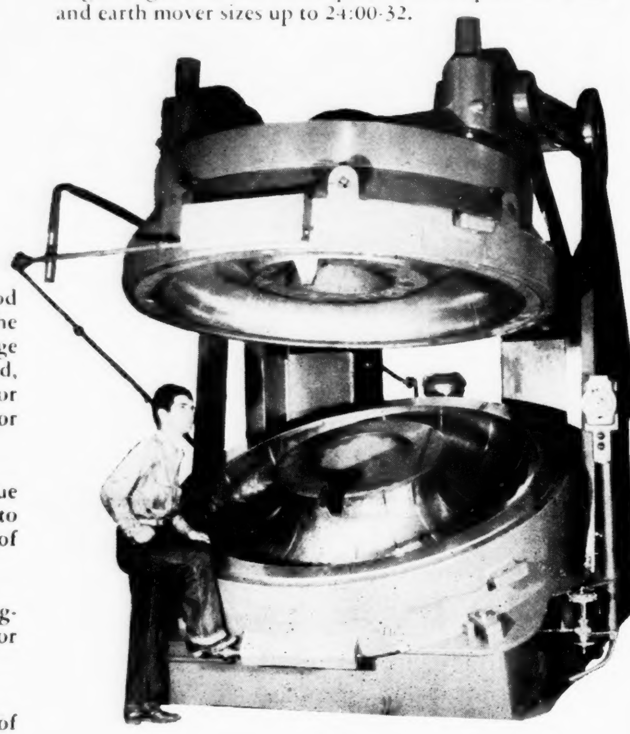
TIRE *and* TUBE CURING PRESSES

IN POPULAR SIZES



Model 675-65"-18D Single Tire Press

Model 400 — 75" — 25, shown below, will handle the larger regular truck sizes, plus farm implement sizes and earth mover sizes up to 24:00-32.



Model 400 — 75" — 25 Tube Press

1

Labor and power saving. Our patented method for stripping any size of tire takes most of the work out of the job. One man can operate a large battery of presses. Very little power is required, as our electrically operated unit requires power for only a few seconds during each cycle, to open or close the press.

2

High production, resulting in lower costs due to almost continuous curing. One-half minute to two minutes for changes, depending upon size of tire being cured.

3

Wide range of flexibility and fast mold changing. Simple and rugged design of mechanism for adjustment to suit mold thickness.

4

Better cures, because of open steam method of curing, plus individual temperature and pressure control, plus cooling if desired. All presses are heavy duty type for high internal pressures.

All the experience and engineering skill of the McNEIL organization is at your call to help you increase efficiency and speed while lowering production costs. For tomorrow's production, check with McNEIL today.

MANUFACTURING AGENTS — GREAT BRITAIN—Francis Shaw & Co. Ltd., Manchester, England
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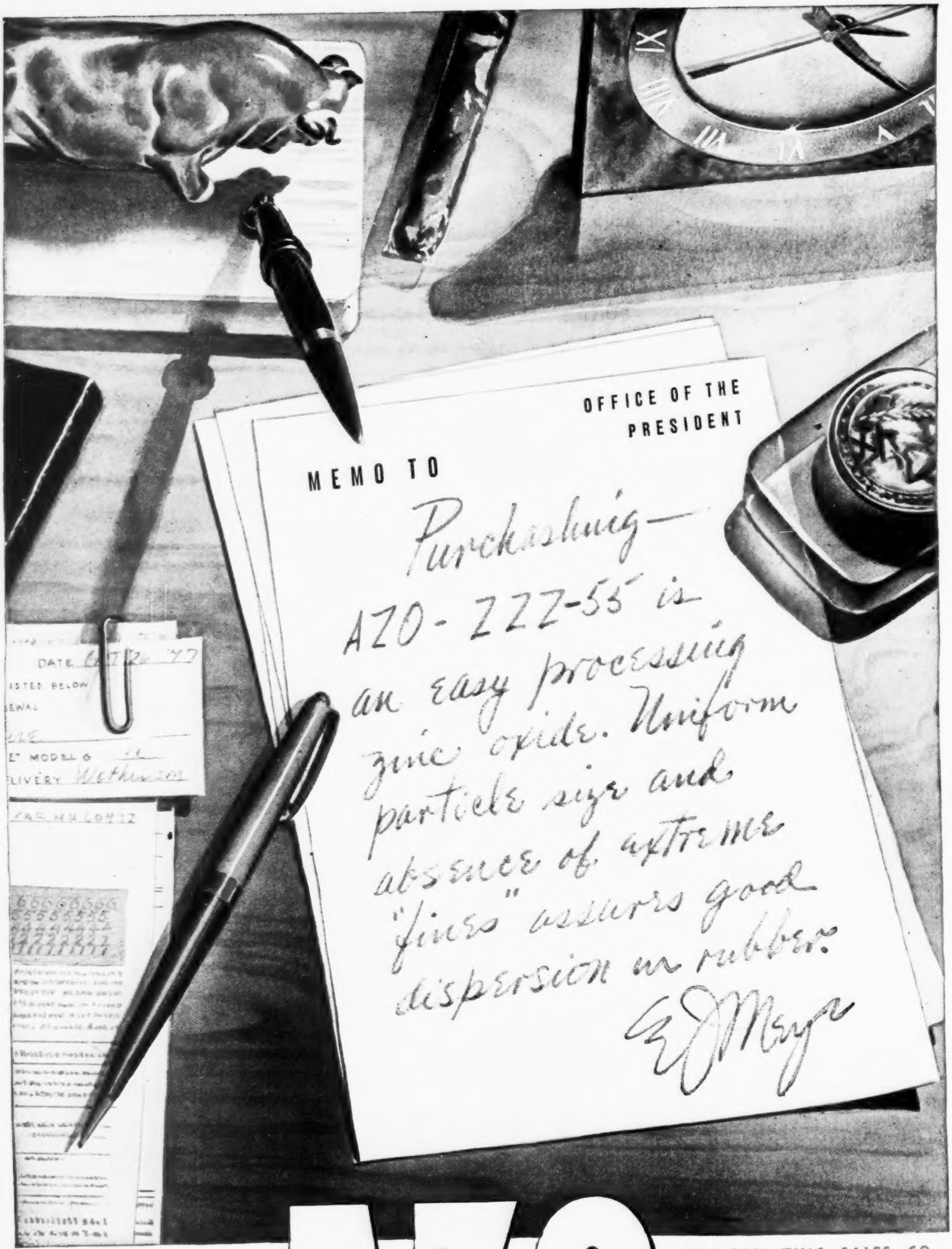
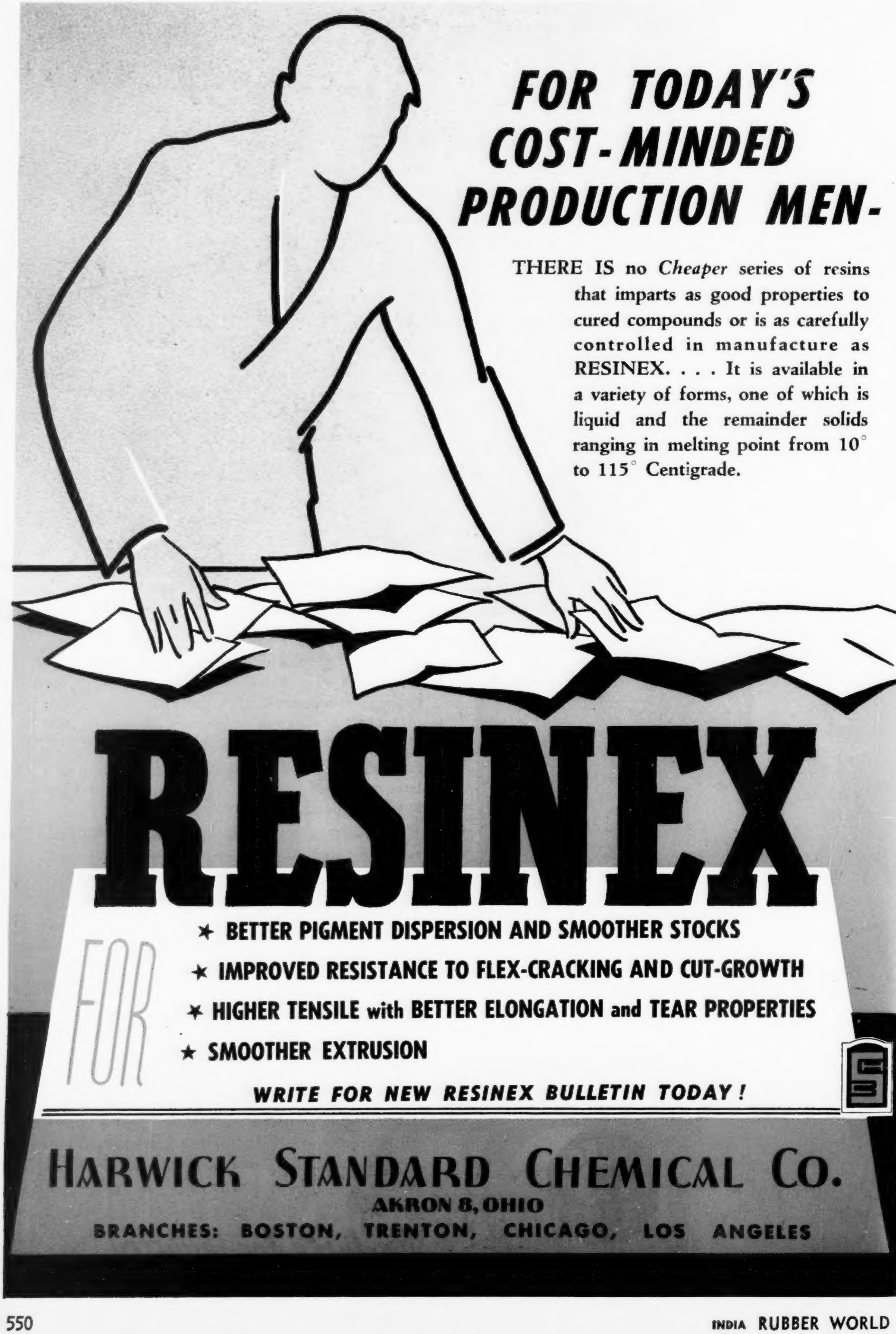
THE McNEIL MACHINE & ENGINEERING CO.

96 East Crosier St. **Akron 11, Ohio**

RUBBER WORKING MACHINERY • INDIVIDUAL CURING EQUIPMENT FOR TIRES, TUBES and MECHANICAL GOODS


OFFICE OF THE PRESIDENT
MEMO TO
Purchasing—
AZO-ZZZ-55 is
an easy processing
zinc oxide. Uniform
particle size and
absence of extreme
"fines" assures good
dispersion in rubber.


FOR TODAY'S COST-MINDED PRODUCTION MEN-
THERE IS no *Cheaper* series of resins that imparts as good properties to cured compounds or is as carefully controlled in manufacture as RESINEX. . . . It is available in a variety of forms, one of which is liquid and the remainder solids ranging in melting point from 10° to 115° Centigrade.
RESINEX
FOR
★ BETTER PIGMENT DISPERSION AND SMOOTHER STOCKS
★ IMPROVED RESISTANCE TO FLEX-CRACKING AND CUT-GROWTH
★ HIGHER TENSILE with BETTER ELONGATION and TEAR PROPERTIES
★ SMOOTHER EXTRUSION
WRITE FOR NEW RESINEX BULLETIN TODAY!
HARWICK STANDARD CHEMICAL CO.
AKRON 8, OHIO
BRANCHES: BOSTON, TRENTON, CHICAGO, LOS ANGELES

IF YOU HAVE

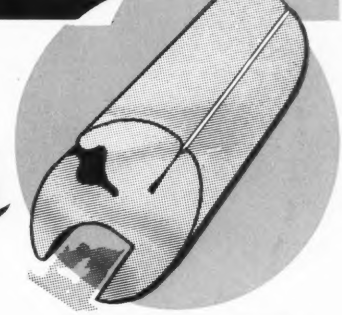
ADHESION TROUBLE WITH EXTRUSIONS

Extrud-O-Lube

LIQUID CONCENTRATE

THE COSTLY WAY

Will Solve Your Problems



WHEN

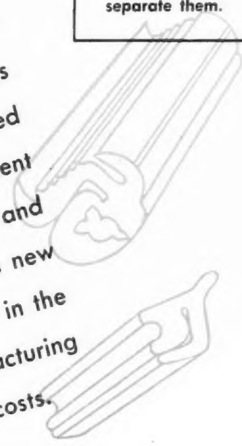
Extrud-O-Lube

is used, lips are adhesion free—no hand labor necessary to separate them.

Here is a new processing aid especially developed to prevent adhesion of sealing lips of channel rubbers and other types of extruded strips, even in feather-edged forms. Clean, smooth edges, free from tackiness or adhesion, plus simplified handling results from its use.

Extrud-O-Lube imparts a strong and tenacious, yet thin film to extruded goods. It does not break down before or during cure. Through its use, costly hand labor, which is necessary in separating sticking sealing lips after cure, is practically eliminated. Then, too, rejects are reduced to a marked extent.

A sample of **Extrud-O-Lube** for testing and evaluation, plus technical data and suggested instructions for use, will be sent upon request. Write today and see for yourself what this new material can do for you in the way of smoother manufacturing operations and lower costs.



Also Mfrs. of

RUBBEROL SYNTHOL AND GLYCERIZED LUBRICANT

THREE OTHER FACTORY PROVED RUBBER PROCESSING AGENTS

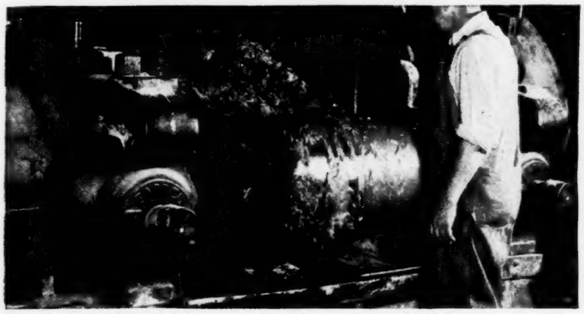
QUALITY SINCE 1884

GENSEKE BROTHERS

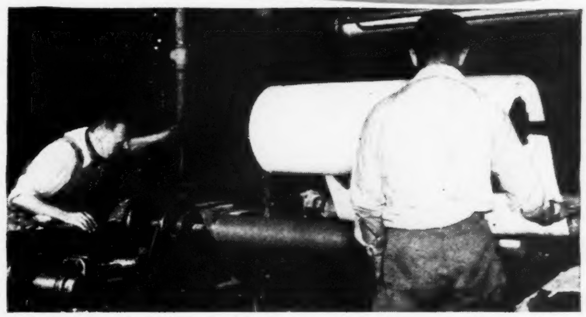
RUBBER MATERIALS DIVISION

West 48th Place and Whipple Street Chicago 32, U.S.A.

PRESS IS A BALDWIN

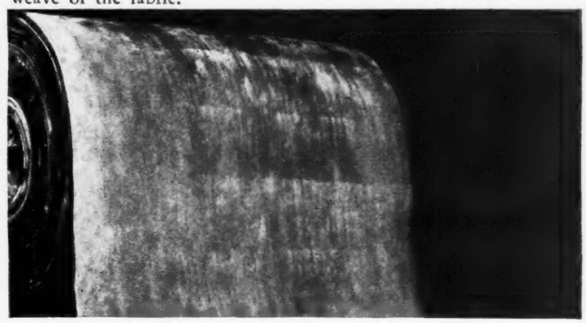


Plasticizing the rubber compound by passing it between rolls. The material is then used for impregnating the carcass, or is calendered for cover stock.

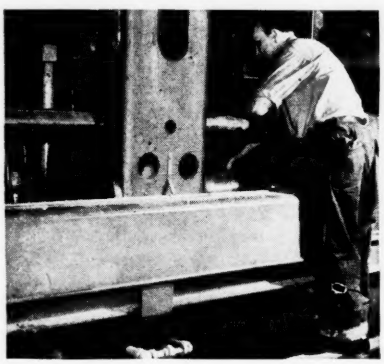


Frictioning the web material. Cotton duck is run against a slower moving roll carrying rubber compound, which is forced into the weave of the fabric.

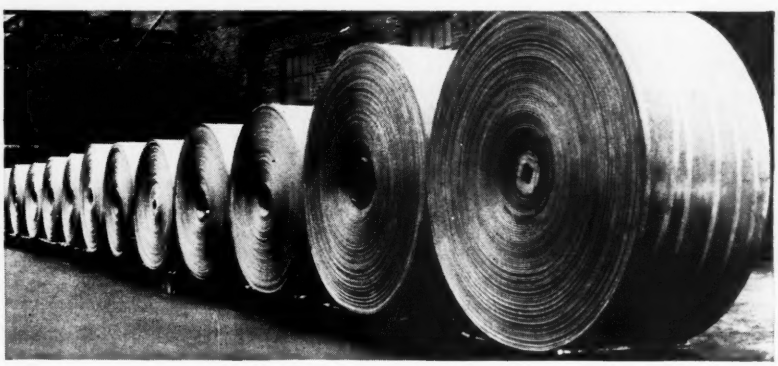
Building the belt body, by applying layers of cover stock to the frictioned carcass. Layers are rolled down to insure adhesion, and eliminate trapped air.



A roll of belting, ready for curing. The unusually wide product which the new press makes possible is suggested by this illustration.



Guiding the uncured belting in the Baldwin press, prior to curing.

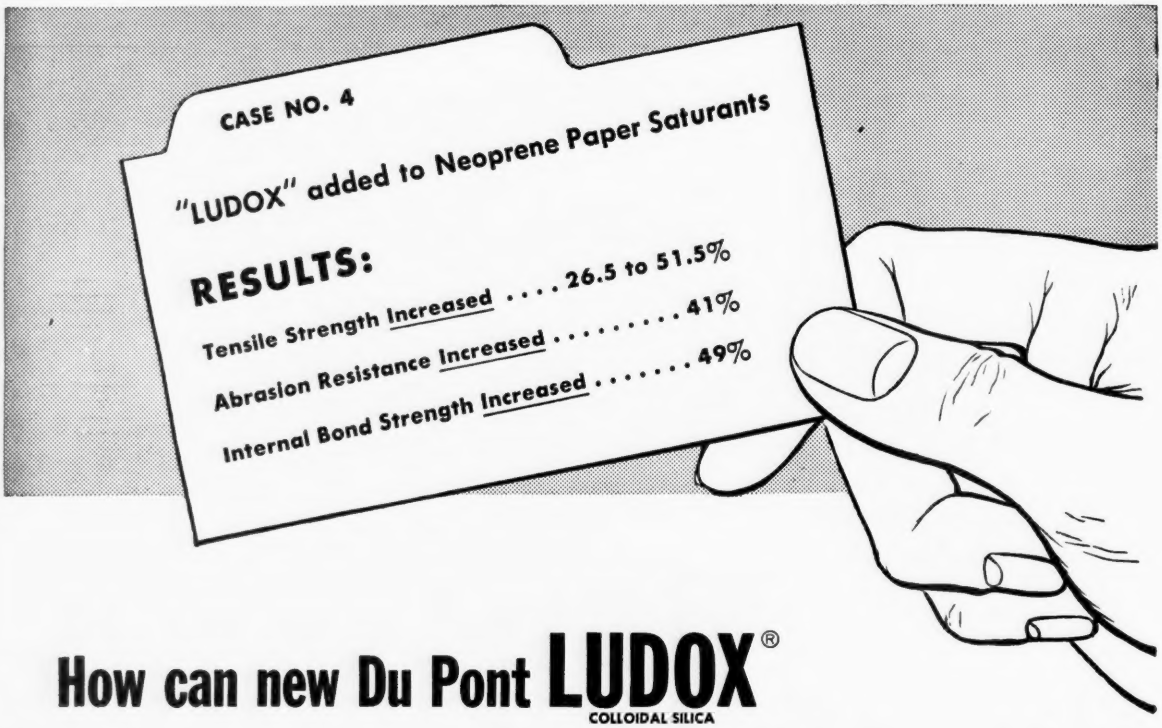


An order for a "mile of belting" ready for shipment.

The Baldwin Locomotive Works, Philadelphia 42, Pa., U. S. A. Offices: Boston, Chicago, Cleveland, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Seattle, St. Louis, Washington. In Canada: Baldwin Locomotive Works of Canada, Ltd., Toronto, Ontario.

BLW
THE BALDWIN GROUP

HYDRAULIC PRESSES



How can new Du Pont LUDOX® COLLOIDAL SILICA improve *your* latex products... broaden your markets?

Whether you produce latex adhesives, thread, dipped or coated goods, it is highly probable that "Ludox" can help you make new or better products that can lead to broader markets.

For greater use with maximum economy, "Ludox" comes to you as a 30% colloidal solution of colorless, almost pure silica particles, less than 1/1,000,000 inch in size. Here are some other examples of what it can do for you:

ADHESIVES: "Ludox" strengthens—up to *3* times—latex adhesion to a wide variety of surfaces, including fabric, leather and metal.

FILMS AND COATINGS: Greatly increased modulus, abrasion resistance and reduced water swelling are obtained when "Ludox" is added to synthetic latex films and coatings.

THREAD: Relatively small amounts of "Ludox" nearly double the modulus of neoprene thread.

FOAM: In neoprene foam, approximately 20% less sponge solids are required to obtain a given modulus—with no adverse effect on flex life, bend flex and compression set.

IN ADDITION, other ways of applying "Ludox" profitably in the rubber field are being developed.

HOW CAN *YOU* USE "LUDOX"? A Du Pont Technical Representative will be glad to visit your plant and study your problems.

Get These Helpful Facts

Clip the coupon below for the latest Technical bulletin on "Ludox" for latex products.

DU PONT
REG. U. S. PAT. OFF.
LUDOX®
Colloidal Silica
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Wilmington 98, Del.
Please send me latest Technical Bulletin on "Ludox" for latex.

Name__________ Title__________

Company__________

Address__________

City__________ State__________

Interested in "Ludox" in__________
(Type of product or products)

* Rebuilding worn parts to original dimensions, and hard-surfacing with our exclusive abrasion-resistant material.

Body assembled on Horizontal Mill for precision checking of alignment of bearings; bolt holes for body fitting bolts, and dowel holes.

Masters Of BANBURY REBUILDING

Save You Time and Money

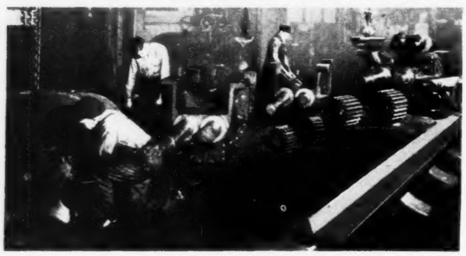
Operating a worn, leaky Banbury is costly. You are mixing extra dollars in with each batch of stock because of lost materials, imperfect blending, and retarded production:—and, too, there is risk of a complete breakdown.

You would find it much more profitable in every way to have us put your Banbury back in tip-top condition.

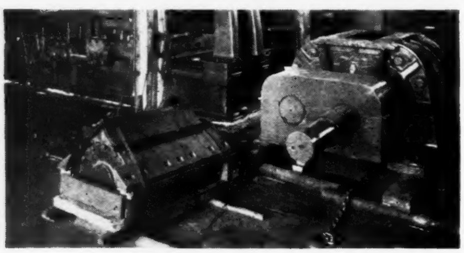
Interstate Engineers are on top of every Banbury problem, thoroughly acquainted with all Banbury requirements through 15 years' specialized experience repairing and rebuilding all sizes and types.

Interstate-rebuilt Banburys are performing with full satisfaction in many plants throughout the United States, and in foreign countries, too.

Let us tell you about our "Pre-Plan" rebuilding service which saves WEEKS of production time. We guarantee every job. Call us now, be time and money ahead.



Completely assembled, up-side-down, for precision fitting of discharge gate.



In tip-top condition, painted, skidded, ready for shipping.

* FREE To Banbury Owners

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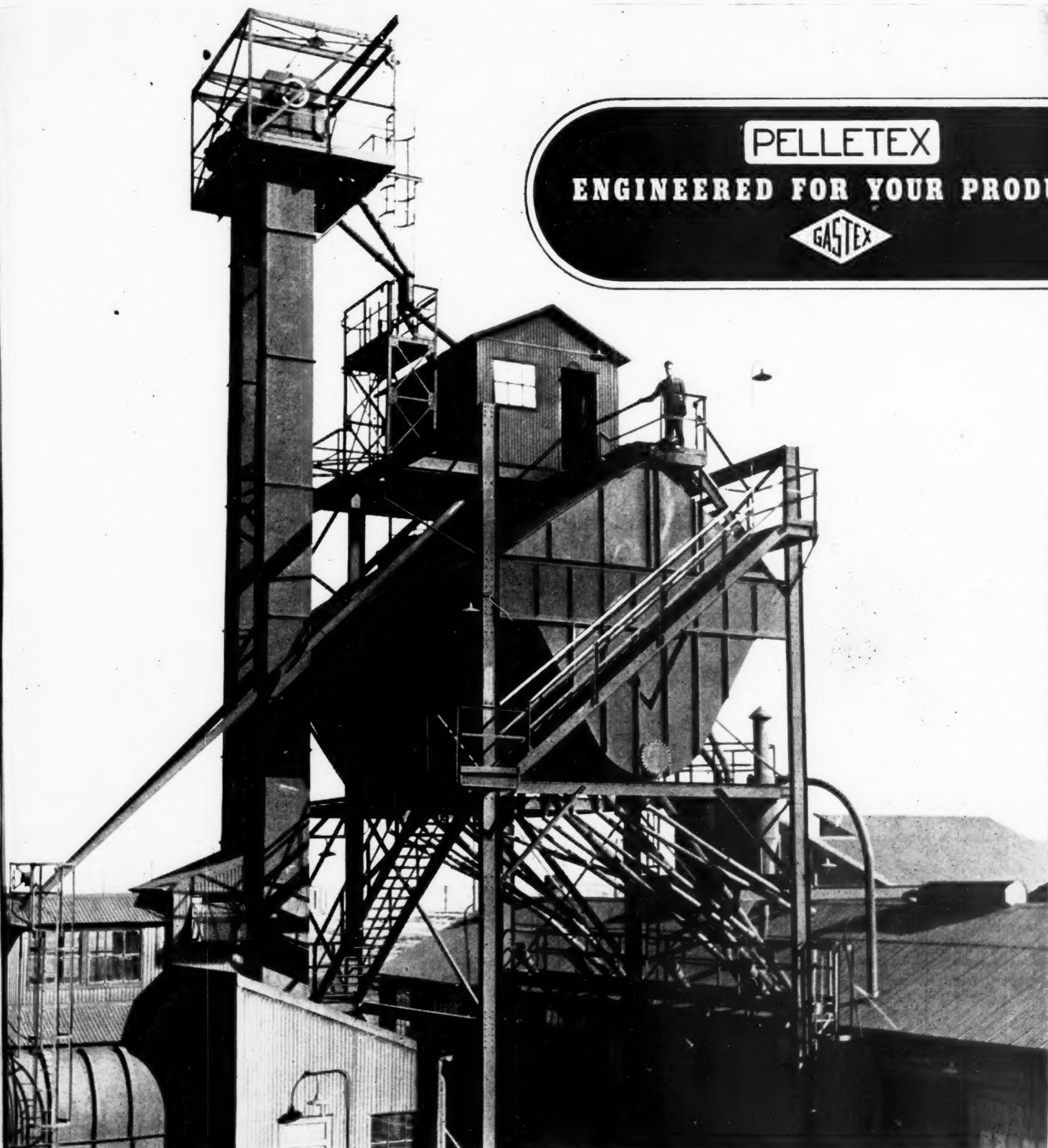
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Cotton as a Raw Material for Industrial Fabrics[1]

Warren F. Busse[2]
and Helmut Wakeham[2]

IN THIS discussion of the merits of various fibers in industrial fabrics we have been asked to present the position and possibilities of cotton. We are glad to do so because this fiber is so important to the economy of the country as a whole, that any rapid major change in the market for cotton is going to have a noticeable effect on the economic life of the whole country, the North and the West as well as the South.

However this statement does not mean that we, or the Institute of Textile Technology at Charlottesville, Va., has a fixed allegiance to, or desire to crusade for, any one fiber. We are studying the essential properties of all major textile fibers — cotton, wool, viscose rayon, acetate, and nylon, and, where possible, also the newer and less widely used fibers such as Vinyon, Fortisan, Orlon, ramie, wire, and glass. It is our aim to learn which properties of each type of fiber make it valuable in the different types of service, and what changes of modifications in the properties would make each fiber more useful, both from the standpoint of processing and of service in the ultimate products. But, because cotton is our most important textile fiber, and because it has been largely neglected from the research standpoint, a substantial part of the initial research work of the Institute of Textile Technology has been on the structure of cotton fibers and on the relation of fiber properties to spinning behavior. The results of many of these studies on cotton may be expected to have applications to synthetic staple fibers.

The present price of cotton is such that part of the market for tire cord has now gone to rayon.

Some individuals have even pessimistically written off the tire market for cotton after 1950, unless the price of cotton is reduced, or the quality is improved.[3]

We would like to discuss some of the factors that may tend to reduce the price or make cotton a more useful fiber and thus improve its competitive position in the field of industrial fabrics.

Factors Responsible for the Dominant Position of Cotton in the Past

The major factors which made cotton such an important fiber in the past are: (1) widespread availability; (2) low cost; (3) good physical properties.

How have these factors been changing and what trends can we expect in the future?

Availability

For more than a century, cotton has been available in this country in large amounts at reasonably low prices. During the late war it was this factor of availability of cotton which was responsible for its use in a number of places where the special physical properties of synthetic fibers might have made them more suitable for the particular service.

Last year the world grew about 25 million bales of cotton. Of this total the United States grew about 12 million bales, on about 23 million acres. The minimum quota which the United States Department of Agriculture could set, if it applied quotas to restrict production, is around 27 million acres. This indicates the probability of still larger crops in the future, and it has been predicted that the government will have something over 10 million bales of cotton stored in its warehouses by 1950. This point seems to indicate that cotton will continue to be available in large amounts in the future and probably will be considerably lower in price than at present.

The increased yields which were obtained last year on fewer acres were due in part to good growing conditions and also in part to a shift in the areas growing cotton from the Southeast, with the relatively small farms, to the Southwest or the plains of Texas, and to the irrigated regions of Arizona and California. Production in 1937 and 1947 in a few typical states is shown in Table 1.

TABLE 1. ANNUAL PRODUCTION IN THE MAJOR COTTON GROWING STATES*

(In Thousands of Bales)

State	Year 1937-38	Year 1947-48
Texas	2,964	3,300
Mississippi	1,656	1,500
Arkansas	1,301	1,200
Alabama	1,064	900
California	415	760
Georgia	851	640

*Data compiled from USDA, Bureau of Census.

It is estimated that California will raise more than a million bales next year and soon have our third largest cotton crop.

[1] Presented before Akron Rubber Group, Feb. 18, 1949.
[2] Institute of Textile Technology, Charlottesville, Va.
[3] M. K. Horne, Jr., at hearings of the Subcommittee on Cotton of the Committee on Agriculture of the House of Representatives, July 7 and 8, 1947.
[4] From the "Annual Review of World Fibers, Food and Agriculture Organization, United Nations."

Cost

The second factor which made cotton the most important textile fiber probably was its relatively low cost. Prices of a number of important fibers in the past are shown in Table 2.

TABLE 2. COMPARATIVE COSTS OF THE MAJOR TEXTILE FIBERS*
(Annual Average Price in ¢ Per Pound)

	1941	1947	1948
Cotton, (10 market average)	13.9	34.4	33.8*
Viscose rayon staple	25.0	31.9	36.4*
Acetate rayon staple		50	50.0†
Vinyon staple		100	100.0†
Wool	108.0	121.6	158.5*
Nylon yarn (100 den.)		180	185.0†

* From *Rayon Organon.*
† From *Rayon & Synthetic Textiles.*

This table shows that the price of cotton has been lower than most other fibers for most of the time.

It is only in the past few years that rayon yarns have become cheaper than cotton yarns. (See Figure 1.)

It might appear from these curves that cotton has permanently lost its place as the lowest-price quality textile fiber. However that deduction is questionable, to say the least, for two reasons.

The first is the new methods which are being developed to grow cotton with very much less labor, higher yields, and lower costs. These include improved varieties of seed, giving higher yields and better resistance to wilt and insect pests, and mechanical methods of planting, cultivating, and harvesting the cotton. These methods are particularly successful in the Mississippi Delta, the plains of west Texas, and California, where the land is flat and farms are large.

It has been estimated that, when cotton is grown in the Delta with a man and a mule and a hoe, it takes 140 man hours to plant, weed, chop, and pick an acre of cotton. With tractors for planting, flame throwers for weeding, airplanes for spreading insecticides and for dusting with calcium cyanamide to defoliate the plants before picking, and mechanical pickers or strippers to harvest the cotton, cotton can be grown for only 28 man hours, or a saving of 112 man hours per acre.

The Mississippi Agricultural Experiment Station estimates that cotton produced by these mechanical means in the Mississippi Delta costs 10.8¢ a pound, excluding the cost of management, land rent, and overhead.[5]

In west Texas some of the shorter staple length cottons have been grown and harvested with as little as seven man-hours per acre.

The second reason that may make it questionable to extrapolate the curves of Figure 1 is the fact that the synthetic fibers are the products of research, and the improvements due to research have already produced enormous reductions in their cost. Du Pont is reported to have spent $30 million on rayon research alone, and presumably American Viscose Corp., Industrial Rayon, and other companies in this field have also spent large amounts, making a total probably many times greater than the money spent on the research in cotton. However, since the price of some of these fibers seems to have reached a level that is determined in a large part by raw materials cost, we cannot look for large further decreases in the cost below those of the prewar period, although there can still be large improvements in the quality.[6]

With cotton, on the other hand, research in any adequate way has just about begun, and there is no telling what the result may be in reduced cost and improved quality of cotton fibers.

[5] Private communication from Southern Regional Research Laboratory, Survey Notes, page 3, November 24, 1948.
[6] Robert B. Evans, Exhibit 5A, Hearings before Special Subcommittee on Cotton of the Committee on Agriculture, House of Representatives, 80th Congress, July 7 and 8, 1947, pages 428-429. Also memorandum to Hon. Stephen Pace, chairman, subcommittee of Committee on Agriculture, House of Representatives, by H. Wickliffe Rose, May 14, 1945.

Quality

The availability or cost of a fiber is of no importance if the fiber does not have the physical and chemical properties that will permit it to do the job. What are the properties of cotton which have made it such an important fiber for industrial as well as apparel use? These include, among others: (a) strength (wet and dry); (b) flexibility; (c) abrasion resistance.

STRENGTH. The strength of present commercial cotton fibers, as measured by the Pressley test, usually runs from about 65,000 to 85,000 pounds per square inch. Typical values for various types are shown in Table 3. This also shows the improvements that have been produced in experimental lots of these types of cottons through breeding.

TABLE 3. STRENGTH OF STANDARD COTTONS AND SIMILAR EXPERIMENTALLY IMPROVED VARIETIES

Variety	Strength (1000's Lbs./Sq. In.) Standard	Improved
Stoneville	81	88
Delfos	76	79
Rowden	84	86
Okla. Triumph	77	84
Mebane	72	82
Acala	89	96

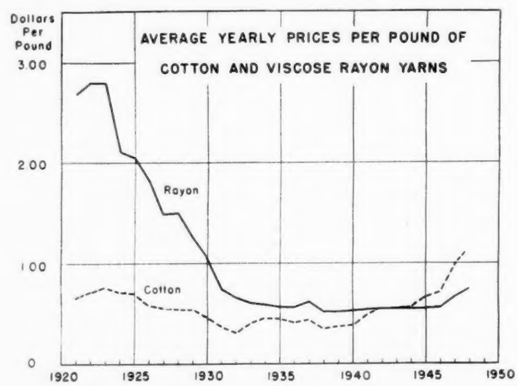


Fig. 1. Average Yearly Prices per Pound of Cotton and Viscose Rayon Yarns. Cotton, 40's Single Combed Peeler Yarn (Average Mid-Month Contract Prices, New York, as Quoted in *New York Journal of Commerce*. Rayon, First-Quality 150-Denier Viscose Process Filament Yarn (Prices at New York as Compiled by *Rayon Organon*)

It should be pointed out that measures of quality such as strength, elongation, and fineness still are not being used to any great extent in purchasing cotton. Nearly all cotton is purchased today on the basis of a classer's subjective judgment when he "pulls a tuft" of cotton. The classer probably subjectively evaluates a number of other properties besides strength and fineness when he evaluates what he calls the cotton's "character." It will be necessary to develop new tests for these other qualities before the laboratory tests of cotton tell the whole story of its spinnability and suitability for various products. The modified Pressley test proposed by J. K. Phillips[7] of one of the rubber companies here in Akron is an example of the type of improved testing procedure needed in textile research.

The strength of any cellulose fiber, particularly when wet, is related to the degree of orientation and crystallization of its cellulose chains. Rayon, which has relatively low crystallinity, has low wet strength and high elongation and growth, under load; ramie and Fortisan-type fibers have high crystallinity and orientation, with high strength, wet and dry, and very low elongation.

Cotton is intermediate in its degree of crystallinity and is intermediate in many of its physical properties.

[7] *Textile Research J.*, 18, 684 (1948).

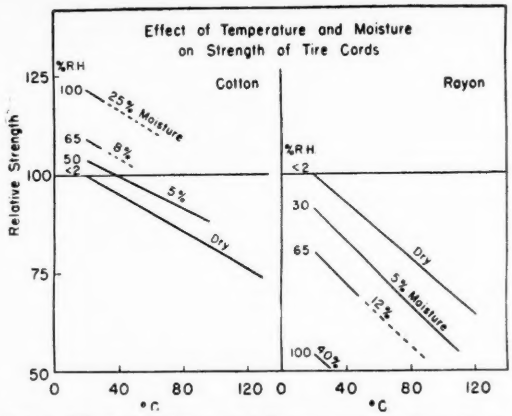


Fig. 2. Effect of Moisture and Temperature on Strength of Cotton and Rayon Tire Cords. (Data from Dillon and Prettyman, *J. Applied Phys.*, 16, 159 (1945); and Wakeham and Coworkers, *Ibid.*, 16, 388 (1945).)

Table 4 shows the comparative values of crystallinity and wet and dry strength and elongation of cotton, rayon, Fortisan, and ramie fibers.

TABLE 4. CRYSTALLINITY, STRENGTH, AND ELONGATION OF CELLULOSE FIBERS

	High Tenacity Rayon	Fortisan	Cotton	Ramie
Crystallinity (%)				
By X-ray	25	..	60	75
By acid hydrolysis	60	83	85	92
Strength (grams/denier)				
Dry	3.5	5.6	3.5	6.0
Wet	2.5	4.0	4.0	7.0
Elongation at break (%)				
Dry	10	6.0	7.0	2.5
Wet	13	7.0	7.5	2.5

Figure 2 shows the effect of moisture and temperature on the strength of cotton and rayon tire cords.

This retention of strength, in cotton tire cords, when wet, may be more significant than would appear at first sight, for the cords in tires have been found gradually to reach equilibrium with the humidity of the air outside; so tires run in humid climates may have cords of relatively high moisture contents. Furthermore, if the tire cord in the tire contains equilibrium moisture at low temperature, it does not lose all its excess moisture when it becomes hot unless the high temperature is maintained for days.[8]

[8] H. Wakeham, E. Honold, H. J. Portas, India RUBBER WORLD, 113, 659 (1946).
W. J. Lyons, H. M. Züfle, M. L. Nelson, *Ibid.*, 116, 199 (1947).
[9] R. C. Waller, K. C. Bass, W. E. Roseveare, *Ind. Eng. Chem.*, 40, 138 (1948).

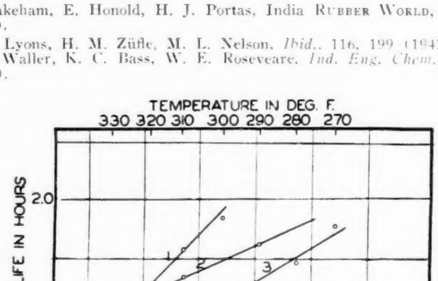


Fig. 3. Change of Vibration Life with Temperature. (Data from "Fatigue of Fabrics," W. F. Busse, D. L. Loughborough, L. Larrick, *J. Applied Phys.*, 13, 715 (1942)

The factor of high wet strength makes cotton a superior material for fire hose and other applications where the fabric is used at high moisture content, such as in rain-resistant tent fabrics and protective covering for industrial equipment.

When it comes to ability to withstand repeated stresses, as in certain fatigue tests, the relative resistance of cotton and rayon depends very much on the temperature, as shown in Figure 3.

It is seen that in this test from the slopes of the two lines rayon is superior at high temperatures; while cotton appears superior at lower temperatures. It is significant, however, that rayon deteriorates faster than cotton when heated in the air.[9]

FLEXIBILITY. Although cotton, compared to other cellulose fibers, is intermediate in crystallinity and elongation, it is outstanding in its flexibility, particularly in cases of severe flexing, as in the Schopper flex tests. This superiority may be due to its unique spiral structure, with alternate regions along the fibers having crystallinity inclined in opposite directions to the fiber axis, perhaps with amorphous regions between them.

Ramie and the Fortisan type of fibers have such low elongation that they are brittle. In spite of its high elongation, rayon also appears to be brittle to certain kinds of stresses — such as those exerted by the Schopper flex test, in which the cord is bent through a sharp angle or in "crushing stresses"—as when a cord is pressed between the grips in a tensile test. One would expect similar effects when one yarn presses on another in a woven belt fabric, or at the center of a twisted tire cord or rope when a tensile stress is applied to the ends.

The superiority of cotton in this type of service may be due to its ability to withstand what are effectively "two dimensional" tensile stresses. We know that the relative behavior of a series of rubber compounds may be very different when tested in a standard tensile test, which applies a one-dimensional tensile stress, and when tested in a "balloon inflation test" which applies effectively two-dimensional tensile stresses. It would not be surprising to find similar differences existing in textile fibers.

ABRASION RESISTANCE. The ability to withstand abrasion is one of the important reasons why cotton has no serious competitors for work clothes. This property also helps to make it valuable in a number of industrial fabrics which are subject to flexing, for "internal abrasion" may play an unexpectedly large part in some of these uses.

The degree of internal rubbing that may exist in bending a tire cord, for example, can be illustrated quite vividly by taking a two-inch rope and putting an inkline around the rope to show the relative position of the three smaller yarns that make it up. Then, if this rope is bent sharply through, say 90 degrees, the relative motion between the component parts of the rope is about ¼-inch with each other in direction of the long axis of the rope.

Granting that this rope is perhaps 100 times the diameter of a tire cord, and so the relative motion might be assumed to be 100 times as great, this phenomenon still leaves relative motions between the yarns of the tire cord greater than the diameter of the cotton fiber. Then if the yarn is bent, not to a diameter of 10 inches, but to a diameter of one inch, the relative motion of the single yarns is much greater. The exact mathematics of this problem have never been worked out, as far as I know, and it would be a good problem for research. Even without an exact solution, however, we can see qualitatively that this factor may be rather important.

Current Improvements in Cotton Quality through Research and Development

It is not only on the natural properties of the fibers that cotton must depend to meet the competition, but also on research to improve the fibers that nature gave us, and to improve the methods of processing them.

A treatment which has been devised to improve the properties of cotton tire cords is the "pulldown." In this treatment the cords are treated with an aqueous solution or suspension or vapors and pulled out and dried or heated to bring down the elongation. It is claimed that this type of treatment influences the change in cord strength with temperature.[10] Similar treatments on the fibers themselves are known to increase, at least temporarily, the strength of the individual cotton fibers.[11]

Considerable improvements were made in cotton tire cords some ten years ago by change or twists with the use of some form of pulldown or tension to reduce the cord elongation before it was made into a tire. These changes allowed shorter staple, lower-price cotton to do a better job in tires than was formerly done by longer staple, or possibly even Egyptian cotton. The effect of wet pulldown on the compactness of tire cords is shown in Figures 4 and 5. These photographs were taken by T. L. W. Bailey, Jr., of the Institute staff.

Table 5. Comparison of Resin Bonded Tire Cord with Untreated Tire Cord

		Equiv. Yarn Count	Breaking Strength in Lbs.		Elongation at 10 Lbs.	
		Cond.	Cond.	Dry	Cond.	Dry
14/3/3 Cotton	Untreated	1.26	16.2	13.1	12.0	8.4
	Fiber bonded	1.40	19.8	19.1	1.5	2.4
21/5/3 Cotton	Untreated	1.23	22.6	20.1	4.4	4.2
	Fiber bonded	1.21	25.0	23.8	1.9	2.2
1650/2 Rayon	Untreated	1.42	23.6	28.6	6.3	3.1
	Fiber bonded	1.53	25.0	29.0	2.2	1.8

*Data from H. Y. Jennings, of Dan River Mills, by private communication.

[10] E. C. Gwaltner, L. A. Graybill, R. B. Newton, U. S. patent No. 2,103,218 (Dec. 21, 1937).
[11] E. J. Cerny, U. S. patent No. 2,387,058 (Oct. 6, 1942).
[12] H. Y. Jennings, U. S. patent No. 2,220,958
[13] W. E. Roseveare, "Annual Meeting of Textile Research Institute," New York (1946).
[14] G. D. Mallory, U. S. patent No. 2,412,524 (Dec. 10, 1946).

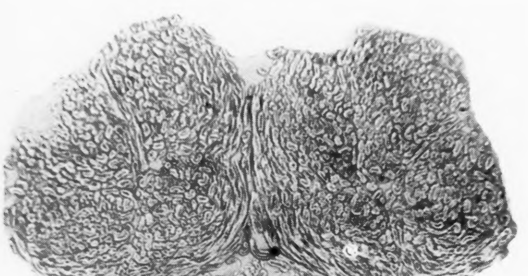


Fig. 4. Cross-Section of Cotton Tire Cord before Wet Stretching

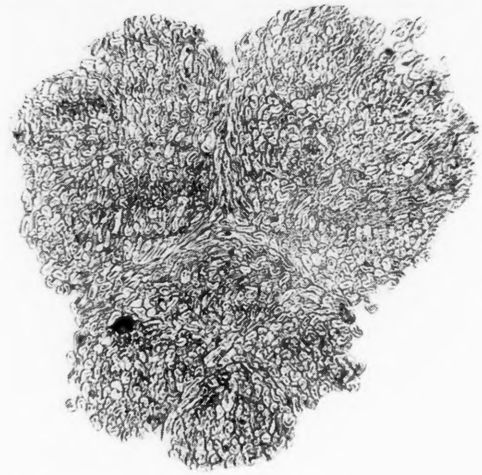


Fig. 5. Cross-Section of Cotton Tire Cord after Wet Stretching

Other treatments that have been proposed include wet stretching the fibers and coating with resin.[12] This is reported to increase the tensile strength of the yarns, and allow the use of less twist, as shown in Table 5.

Other treatments now being developed include treating the fibers with glyoxal, or melamine resins, etc., to change their elasticity and swelling in water. While these treatments perhaps are being studied most intensively in connection with creaseproofing of rayon, there is some evidence that they work even better with cotton. Perhaps the thing that is holding back work in this field mostly is lack of adequate tests to evaluate fiber properties such as flexibility and fatigue resistance.

Attention should be given to the stability under axial compressive stresses, another mechanical property of the tire cords which has only occasionally been mentioned in the literature or discussions.[13] Again this can be illustrated by a large rope. If such a rope is grasped with the hands at places three or four inches apart, and the hands are pushed together, the individual strands tend to push out in all directions. If, instead, the rope is grasped at points a foot apart, the rope will act as a long thin column and buckle under only moderate axial compression stresses. Such behavior may be very important in tires and probably determines, in part at least, the behavior of the cords in the "twirling tube" test proposed by G. D. Mallory,[14] of the Goodyear Tire & Rubber Co.

Summary and Conclusions

The lack of suitable tests for evaluating raw cotton fibers in the laboratory is also limiting the effectiveness with which the mill can buy cotton for specific processes and products and is handicapping the breeders who are trying to improve the cotton varieties. Congress has appropriated extensive funds for agriculture research under the Agriculture Research and Marketing Act. The allotment of adequate funds for cotton investigations would provide a golden opportunity for the development of better tests for the evaluation of cotton quality. Such work is of primary importance to the whole cotton industry. It would help the breeder to grow better cottons, the mill buyer to obtain the best cotton available for his needs, and the fiber research scientist to develop better methods of improving the cotton fibers that nature produces.

(*Continued on page* 634)

Compounding of GR-S with a New Fine-Particle Silica—I

E. M. Allen,[1] F. W. Gage,[1] and Ralph F. Wolf[1]

As in natural rubber, the use of the recently announced[2] fine-particle silica, Hi-Sil, in regular or low-temperature general-purpose synthetic rubber results in physical properties exceeding those obtainable with non-black pigments commercially available at this time.

This reinforcing effect is of greater relative importance in GR-S and its variants than it is in natural rubber. Natural rubber has high strength unloaded. Even after incorporation of some amount of fairly coarse filler natural rubber maintains a respectable level of physical strength. Starting out at a very low level in the pure gum state, GR-S, on the other hand, cannot afford to sacrifice anything. Only one or two non-black pigments previously available have augmented even slightly the properties of GR-S. This condition, of course, is the reason why so few colored GR-S goods have appeared. The advent of Hi-Sil should change this situation. Its use makes it possible to obtain physical properties approaching those of a black stock in white or light-colored GR-S compounds.

Properties and Availability of Hi-Sil

Hi-Sil is the first practical fine-particle silica pigment ever offered to the rubber compounder at a reasonable price. It is a hydrated silicon dioxide having a particle size of 0.025-micron, about the same as that of easy processing channel black. Specific gravity of Hi-Sil is 1.95. This is lower than the gravity of most silicas because of the presence of water of hydration.

Actually there are few compounds in nature that outrank silica in abundance. It should, therefore, be regarded as an "ace in the hole" against future scarcity or high cost of the fine carbon blacks on which the rubber industry has been dependent for making the highest quality rubber goods.

Hi-Sil is a cheap material, and it will become even cheaper with increased volume of production. Its development in the laboratories of the Columbia Chemical Division of The Pittsburgh Plate Glass Co. stems from the discovery of a means of producing extremely fine silicas from cheap starting materials.

After thorough laboratory and factory testing of pilot-plant material the commercial production of Hi-Sil began in April of this year, and it is now a definitely established ingredient in a variety of natural and synthetic rubber compounds. The availability of Hi-Sil is therefore insured as more compounders become familiar with the unusual characteristics of this new reinforcing non-black pigment.

Compounding in GR-S

Properties imparted by Hi-Sil to natural rubber have already been described.[2] The present paper will deal only with the properties it imparts to GR-S.

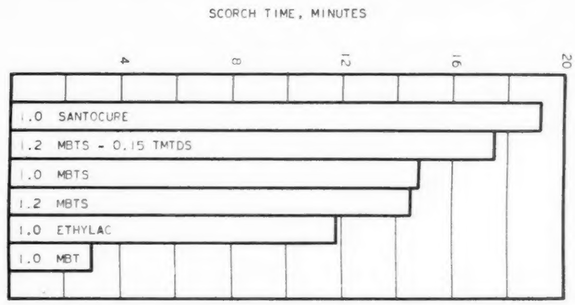


Fig. 1. Comparison of Scorch Rates of 30-Volume Hi-Sil Loaded GR-S Stocks Accelerated with Combinations of Various Thiazoles and 0.25-Part TMTDS

Table 1. Properties Obtained with Several Typical Combinations of Accelerators in GR-S Stocks Loaded with 30 Volumes of Hi-Sil

Base Formula

GR-S	100
Hi-Sil	58.5
Zinc oxide	5
Phenyl-Beta-napthylamine	1
Sulfur	3
Accelerator	As shown
100° coumarone resin	15
Diethylene glycol	3.5

Cure at 280° F. Min.	Modulus 300%	Tensile P.S.I.	% Elongation	Durometer Hardness (30")	Tear Lbs./In.	Scorch Time (Min.)
			Santocure 1.5			
15	255	1175	885	40	230	61
30	680	2510	585	57	210	
45	735	2440	550	62	180	
60	795	2540	560	63	190	
120	850	2765	560	63	170	
180	850	2750	565	64	170	
240	865	2565	550	64	170	
			Ethylac 1.5			
10	240	1320	920	40	210	33½
15	720	2500	565	59	220	
30	780	2180	485	60	160	
45	710	2070	485	60	160	
60	780	1900	455	60	130	
90	790	1720	435	60	170	
			Ethylac 1.0 and TMTDS 0.15			
10	610	2750	645	56	190	18
15	810	2410	550	59	200	
30	820	2540	540	60	160	
45	750	2400	520	58	220	
60	770	2160	505	58	170	
90	790	2200	505	58	180	
			MBTS 1.2 and TMTDS 0.15			
10	470	2510	715	55	270	18½
15	670	2550	620	60	270	
30	720	2470	585	60	260	
45	620	2480	605	58	240	
60	570	2230	590	56	190	
90	570	2240	595	56	180	

Three points in particular must be kept in mind when Hi-Sil loaded GR-S compounds are being compounded:

1. Hi-Sil stocks require more than the normal amount of acceleration.
2. As is the case with Columbia's Silene EF, diethylene glycol is a valuable aid for producing fast cures and improving physical properties.
3. As is the case with all other non-black pigments, coumarone-indene resin is necessary to obtain the physical properties potentially available.

Hi-Sil is an extremely absorptive material because of its fine particle size and great surface area. Therefore Hi-Sil loaded GR-S stocks containing what would be considered a normal amount of acceleration are slow curing. Tight cures, however, can be obtained in a reasonable time by use of combinations that would be too "hot" for other pigments. The use of one part of a thiazole, activated by ¼-part of a thiuram, is suggested

[1] Columbia Chemical Division, Pittsburgh Plate Glass Co., Barberton, O.
[2] India Rubber World, July, 1949, p. 439. *Rubber Age (N. Y.)*, June, 1949, p. 297, "Compounding of Natural Rubber with a new Fine Particle Silica."

as a starting point for the development of any Hi-Sil loaded GR-S stock. The amount of either accelerator can then be varied as conditions require. Physical properties obtained with several good typical accelerator combinations are shown in Table 1.

The reason for using 5-10% of diethylene glycol on the weight of the pigment is clearly illustrated in Table 3.

TABLE 2. EFFECT OF DIETHYLENE GLYCOL IN GR-S STOCK LOADED WITH 30 VOLUMES OF HI-SIL

Formula

GR-S	100
Hi-Sil	58.5
Zinc Oxide	5
Phenyl-Beta-naphthylamine	1
Sulfur	3
MBTS	1
TMTDS	0.25
100° coumarone resin	15
Diethylene glycol	As shown

Diethyl-lene Glycol	Optimum Cure at 280° F. Min.	Modulus 300%	Tensile P.S.I	% Elong-ation	Durometer Hardness (30")	Tear Lbs./In.
None	90	250	1325	965	..	..
3.5	15	775	2375	555	60	190

As shown in Table 3, about ten parts of a coumarone-indene resin (m.p. 100° C.) are required to obtain maximum physical properties.

TABLE 3. EFFECT OF VARIOUS AMOUNTS OF COUMARONE-INDENE RESIN ON PHYSICAL PROPERTIES OF GR-S STOCK LOADED WITH 30 VOLUMES OF HI-SIL.

Formula

GR-S	100
Hi-Sil	58.5
Zinc oxide	5
Phenyl-Beta-naphthylamine	1
Sulfur	3
MBTS	1.2
TMTDS	0.15
Diethylene glycol	3.5
100° coumarone resin	As shown

Coumar-one Resin	Optimum Cure at 280° F Min.	Modulus 300%	Tensile P.S.I.	% Elong-ation	Durometer Hardness (30")	Tear Lbs./In.
None	15	1160	1910	400	64	170
5 Parts	15	960	2270	485	61	210
7.5 Parts	30	920	2260	500	60	200
10 Parts	30	880	2510	530	60	210
15 Parts	30	725	2500	585	60	260

On the basis of the above results, it was decided to use 3.5 parts of diethylene glycol and 10 parts of a 100° C. m.p. Coumarone resin on 100 parts of GR-S in all future work on acceleration and comparative compounding.

SCORCH TIME. Using the recipe shown in Table 1 with the exception that the coumarone resin was reduced from 15 to 10 parts, scorch times[3] of various accelerator combinations were determined. These are shown in Figure 1. The combination of MBTS 1.2 and TMTDS 0.15 was chosen for the Hi-Sil compound used in the range of cure comparison made with Silene EF and EPC black. This combination imparts both reasonable scorch time and good physical properties.

RANGE OF CURES. The results of the direct comparison between 10-, 20-, and 30-volume loadings of Hi-Sil, an EPC black, and Silene EF over a range of cures are shown in Tables 4-6, and a comparison of the best cures is presented graphically in Figures 2-4. Table 4 and Figure 2 give comparisons of stress-strain, tear resistance and hardness; Table 5 compares the rebound and heat build-up; Table 6 summarizes compression set and flexing. Figure 3 shows heat build-up, rebound, and compression set; Figure 4 illustrates comparative flex crack growth and Mooney scorch data on the three pigments. The recipes used for each pigment were as follows:

FORMULAE FOR RANGE OF CURE TESTS

	Hi-Sil	Silene EF	EPC
GR-S	100	100	100
Pigment		As shown	
Zinc oxide	5	5	5
Phenyl-Beta-naphthylamine	1	1	1
Sulfur	3	3	1.75
100° coumarone-indene resin	10	10	..
Coal-tar softener	..	..	5
Pine tar	..	..	3
Diethylene glycol	*	*	..
Santocure	..	1.5	1.25
MBTS	1.2	..	..
TMTDS	0.15	..	..

*6% of pigment.

TABLE 4. COMPARISON OF HI-SIL, SILENE EF AND EPC BLACK

Loading (Vols.)	Cure at 280° F. Min.	Modulus 300%	Tensile	Elong-ation	Durometer Hardness (30')	Tear Lbs./In.
			HI-SIL			
10	35	170	890	640	44	70
	45	240	740	490	47	70
	60	340	610	450	50	70
	90	370	670	410	51	60
20	20	260	2160	750	49	150
	30	450	2270	590	53	140
	45	470	2280	570	54	140
	60	480	2170	550	54	110
	90	470	2010	560	54	100
30	10	370	2080	780	49	160
	15	620	2550	620	55	200
	20	620	2480	600	56	190
	30	670	2370	550	59	190
	60	740	2380	540	60	160
			SILENE EF			
10	15			Undercured		
	20	130	600	430	55	50
	30	140	450	300	55	50
	45	140	610	360	55	50
	60	140	400	290	56	50
20	10			Undercured		
	15	450	1910	560	56	90
	30	540	1530	470	59	90
	45	600	1590	470	59	80
	60	550	1290	430	60	70
30	10	310	1390	690	45	..
	15	890	2030	490	65	160
	30	870	1720	450	65	130
	45	920	1800	430	65	120
	60	950	1820	420	65	110
			EPC			
10	60	240	1040	600	46	90
	90	300	1050	540	47	80
	120	330	1050	510	49	80
	180	330	1020	510	49	70
20	60	470	2650	720	51	210
	90	620	2860	650	54	230
	120	710	2480	590	55	190
	180	780	2600	570	55	210
30	60	880	3120	650	57	340
	90	1210	3150	660	60	320
	120	1360	3490	560	61	300
	180	1590	2990	470	64	270

TABLE 5. COMPARISON OF REBOUND AND HEAT BUILD-UP OF HI-SIL, SILENE EF, AND EPC BLACK IN 10-, 20-, AND 30-VOLUME LOADINGS

Pigment	Loading (Volumes)	Cure at 280° F. (Min.)	Rebound-% (Goodyear-Healy)	ΔT-°F. (Goodrich Flexometer)
Hi-Sil	10	45	56	53
		60	56	52
		90	56	56
	20	30	50	79
		45	51	73
		60	50	73
	30	15	46	101
		30	46	84
		45	46	90
Silene EF	10	20	58	..
		30	59	36
		45	58	36
	20	15	51	..
		30	51	54
		45	52	57
	30	10	44	..
		15	45	81
		30	46	76
EPC	10	90	54	72
		120	54	64
		180	55	65
	20	90	48	85
		120	49	77
		180	49	82
	30	60	41	..
		90	42	..
		120	40	112

Results of tests in which the samples were aged in an oven for four days at 100° C. are given in Table 7 and are presented graphically in Figures 5 and 6.

[3] H. Shearer, A. E. Juve, J. H. Musch, India RUBBER WORLD, Nov., 1947, pp. 216-19.

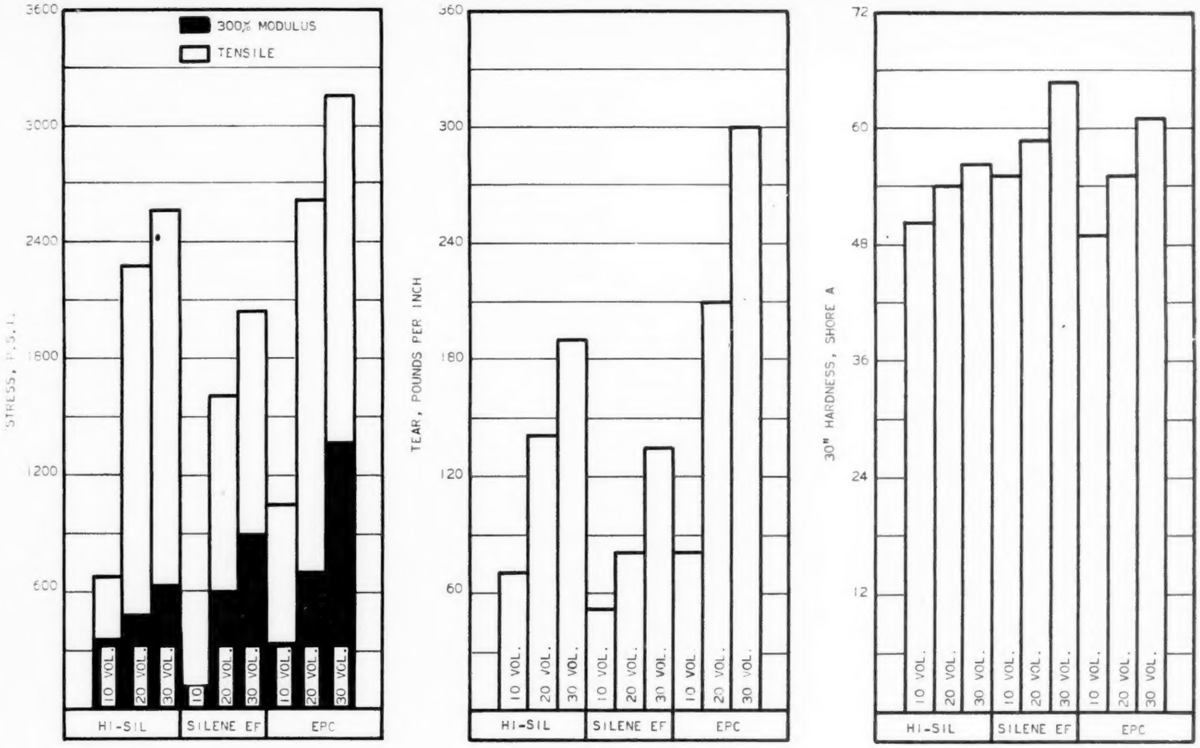


Fig. 2. Comparison of Stress-Strain, Tear Resistance, and Hardness of Hi-Sil, Silene EF, and EPC Black, in 10-, 20-, and 30-Volume Loadings, in GR-S

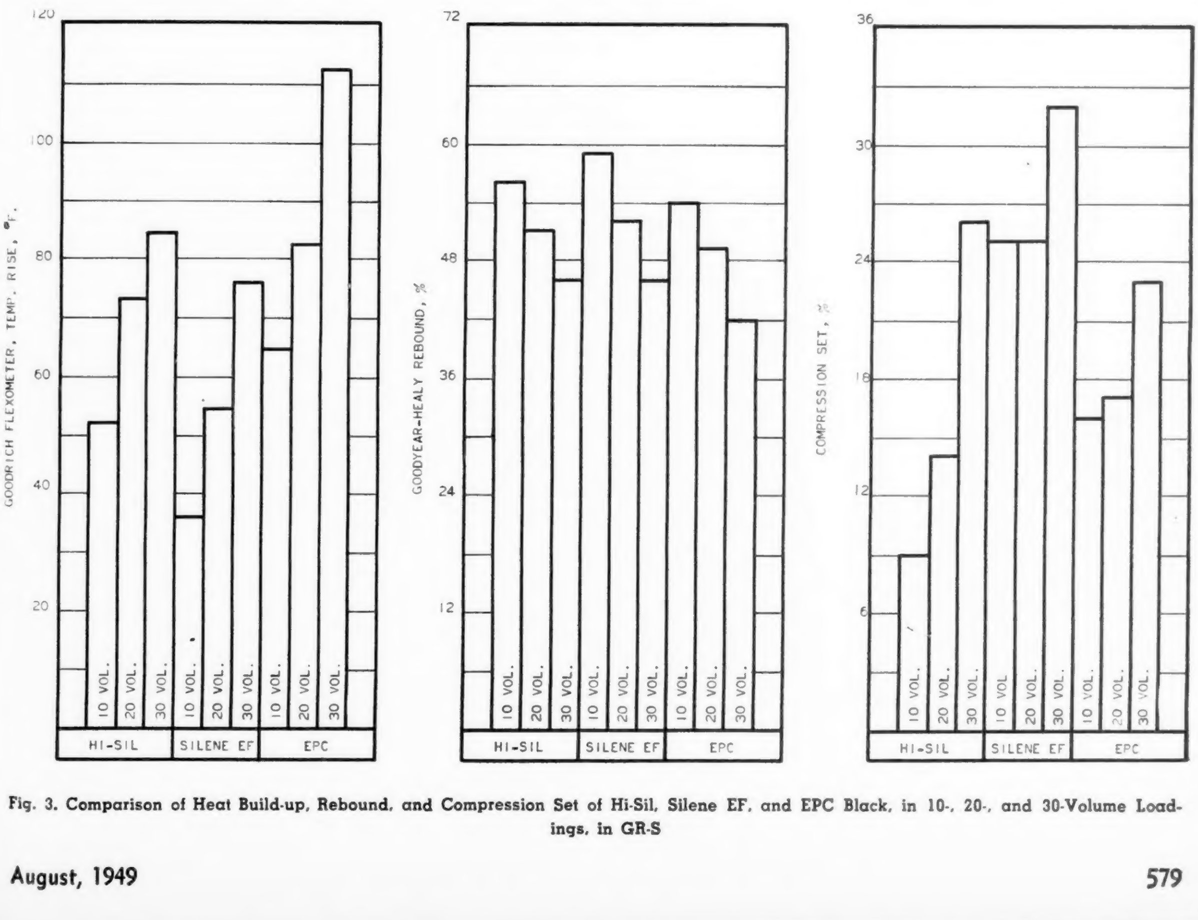
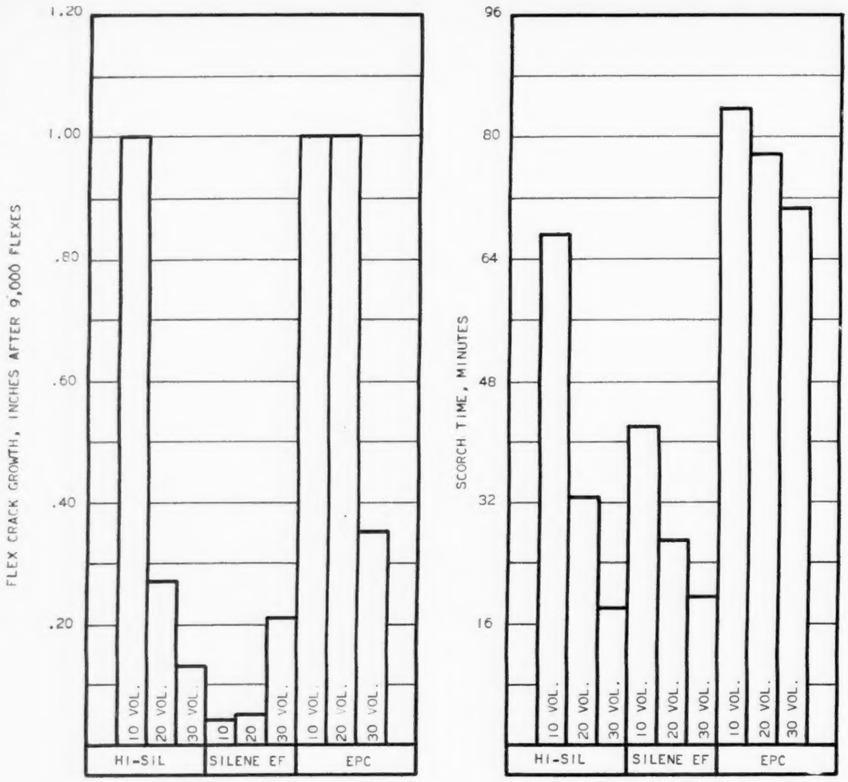
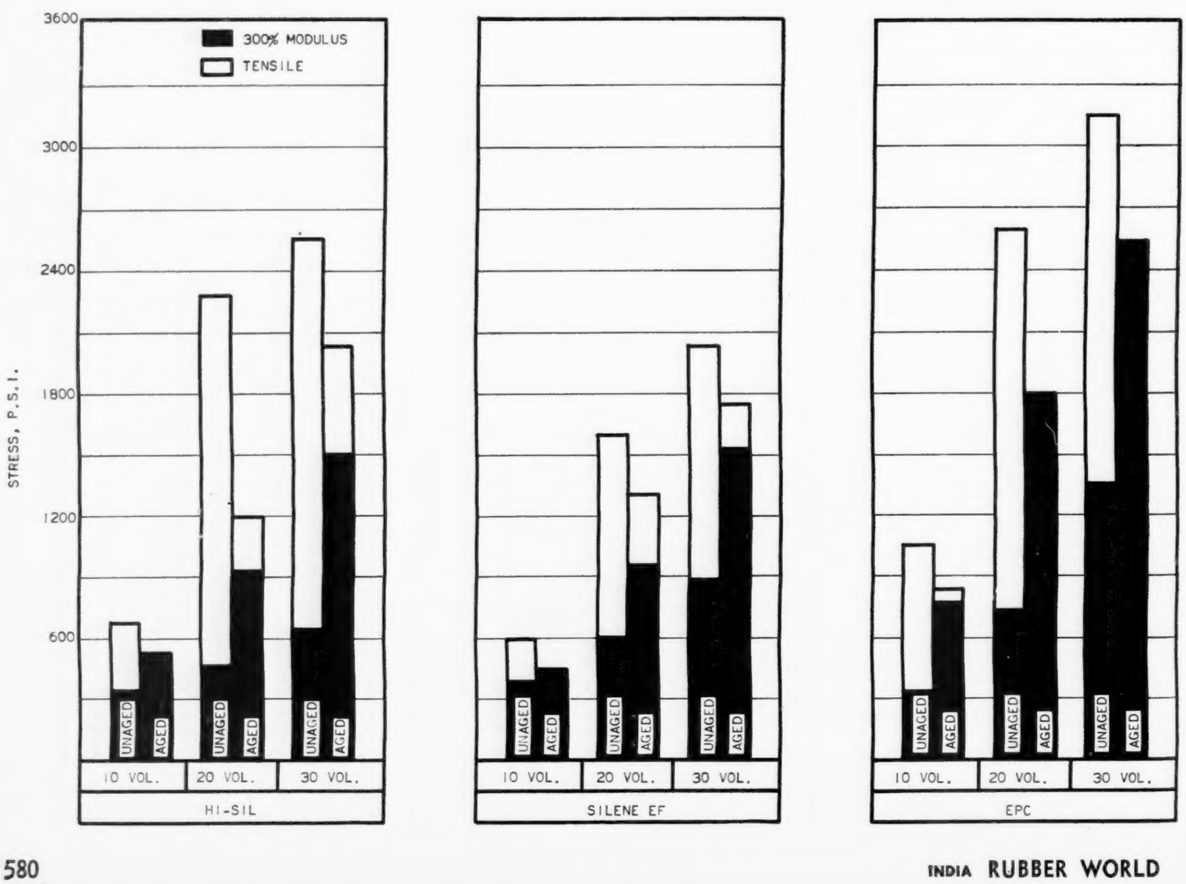


Fig. 3. Comparison of Heat Build-up, Rebound, and Compression Set of Hi-Sil, Silene EF, and EPC Black, in 10-, 20-, and 30-Volume Loadings, in GR-S



(Left)
Fig. 4. Comparison of Flex-Crack Growth and Mooney Scorch of Hi-Sil, Silene EF, and EPC Black, in 10-, 20-, and 30-Volume Loadings, in GR-S

(Below)
Fig. 5. Comparison of Stress-Strain of Hi-Sil, Silene EF, and EPC Black, in 10-, 20-, and 30-Volume Loadings, in GR-S before and after Aging Four Days in Air at 100° C.



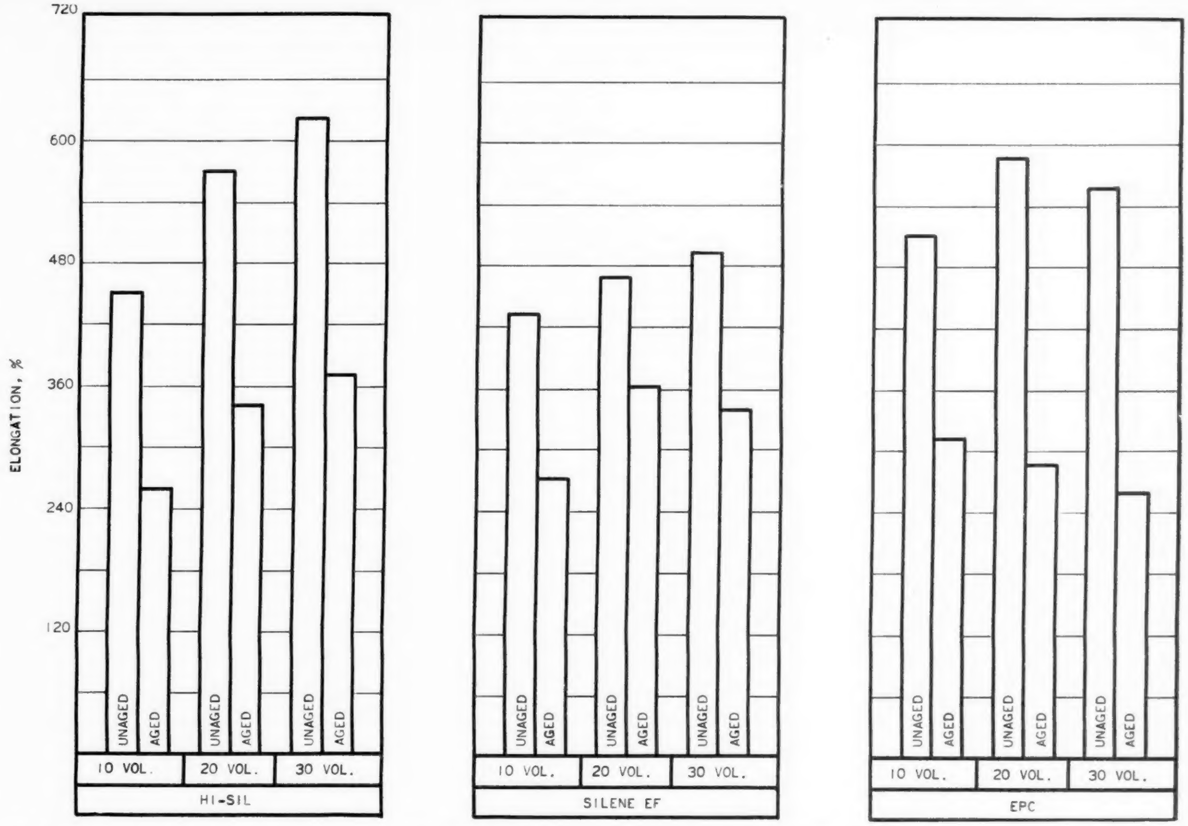


Fig. 6. Comparison of % Elongation of Hi-Sil, Silene EF, and EPC Black, in 10-, 20-, and 30-Volume Loadings in GR-S before and after Aging Four Days in Air at 100° C.

TABLE 6. COMPARISON OF COMPRESSION SET AND FLEX-CRACK GROWTH OF HI-SIL, SILENE EF, AND EPC BLACK IN 10-, 20-, AND 30-VOLUME LOADINGS

Pigment	Loading (Volumes)	Cure at 280° F. (Min.)	% Compression Set (Method B)	DeMattia Flexing-% (In. 9,000 Flexes)
Hi-Sil	10	45	25	1
		60	14	1
		90	9	1
	20	30	28	.27
		45	13	.95
		60	14	.94
	30	15	48	.13
		20	41	.21
		30	26	.20
Silene EF	10	20	55	.03
		30	34	..
		45	25	..
	20	15	..	.04
		30	36	..
		45	25	..
	30	10	..	.05
		15	61	.21
		30	32	..
EPC	10	90	30	1
		120	21	1
		180	16	1
	20	90	29	1
		120	22	1
		180	17	1
	30	60	44	..
		90	29	.35
		120	23	.33

TABLE 7. COMPARISON OF HI-SIL, SILENE EF AND EPC BLACK IN 10-, 20,- AND 30-VOLUME LOADINGS; OVEN-AGED FOUR DAYS AT 100° C.

Pigment	Loading (Volumes)	Cure at 280° F. (Min.)	Modulus 300%	Tensile	Elong-ation	Durometer Hardness (30")
Hi-Sil	10	45	..	510	260	60
		60	..	530	260	57
		90	..	480	260	56
	20	30	1010	1090	310	62
		45	920	1180	340	60
		60	910	1260	360	62
	30	15	1630	1940	350	70
		20	1500	2040	370	70
		30	1400	2130	400	70
Silene EF	10	20	..	450	270	60
		30	..	470	260	61
		45	..	470	260	60
	20	15	980	1260	340	68
		30	950	1260	360	67
		45	950	1290	360	67
	30	10	1400	1770	360	75
		15	1520	1740	340	76
		30	1420	1650	330	75
EPC	10	90	..	810	270	60
		120	790	820	310	58
		180	780	890	330	56
	20	90	..	1790	280	69
		120	..	1800	290	68
		180	..	1620	290	65
	30	60	..	2470	260	76
		90	..	2180	230	77
		120	..	2520	260	76

As in natural rubber, Hi-Sil is shown to be definitely superior in almost all respects to the lower-cost calcium silicate pigment, Silene EF, which until now has been one of the best non-black materials available. The tensile and tear resistance are lower than those of the EPC stock. Elongation is better than that of black at the higher volume loading. The rebound of the Hi-Sil stock is better than that of the black at all loadings, and, as might be expected from this result, the heat build-up, as measured by the Goodrich flexometer, is noticeably lower. Compression set of the Hi-Sil stocks is better than that of black in the 10-, and 20-volume loadings and slightly poorer at 30 volumes. Hi-Sil stocks definitely have better resistance to flex crack growth than the black stocks, except at 10-volume loadings. Silene EF appeared

(*Continued on page 586*)

Some Statistics of the Rubber Plantation Industry, with Special Reference to the Smallholder—II

P. T. Bauer

The following installment concludes the informative and thought-provoking article on the Far Eastern rubber plantation industry, which began in our July issue and which was written by the well-known English economist, P. T. Bauer, now at Gonville & Caius College, Cambridge.

Price and Production Data on Smallholders' Rubber

It is still widely believed in the most unexpected quarters that the supply curve of rubber from smallholdings is backward-rising, i.e., that a fall in price stimulates production and a rise tends to reduce it.[10] Rigorous disproof of this view is rendered difficult by the well-known statistical and conceptual complications which affect attempts to infer functional relations from statistical data. Ultimately these difficulties all reduce to the fact that over the period under review "other things did not remain equal" and that the data summarize coincidences in time which are not necessarily casually related. Juxtaposition of data of rubber production and prices (even if accompanied by correlation analysis) is not sufficient to establish conclusively a functional relation. When production figures are shown in terms of capacity working, there is a somewhat stronger presumption that changes in price and variations in the rate of capacity working are casually connected, since one important variable (changes in capacity) is largely[11] eliminated. But even data thus presented would not satisfy the exacting requirements postulated by econometricians before admitting a functional relation.

This section summarizes most of the available data on smallholders' production and its relation to price. There is no difficulty in disposing of the views (such as those quoted in a previous footnote) that the statistics show that "low prices bring out the greatest native production." The statistics quite clearly show the reverse; but it must be admitted that although they set up a strong presumption of a positive functional relation between smallholders' production and the price of rubber (there is in most cases a highly significant correlation between price and smallholders' production, especially when expressed in terms of capacity working), a more refined analysis than is presented here would be required to establish conclusively the existence of a functional relation. The presumption is in accordance with expectations for the N.E.I., Sarawak, and Siam since it is well-known that smallholders in these territories can fairly easily shift to alternative products. But in Malaya, too, the supply curve of smallholders' rubber, though very inelastic, would seem to be distinctly forward-rising.

The most suitable data bearing on this subject refer to the years 1929-34, as before and after these years organized regulation was in force in some or all the principal producing territories.[12] Prices and outputs over these years are presented in Table 2, which summarizes the output of Malaya and N.E.I. smallholders' rubber for the years 1929-33. Tables 4-6 summarize data on the rate of capacity working. For the N.E.I. smallholders, exports have been taken as equivalent to output, as no production figures are available for the period as a whole; the error introduced by this procedure is negligible over the period. The Malayan figures allow for stock changes. As well as aggregate production figures, data are also presented to show output per mature acre. As the mature acreage at any given time depends on planting five or more years previously, output figures expressed in terms of production per mature acre indicate the responsiveness to price changes better than do figures of aggregate output. For the N.E.I. the production figures per acre are highly conjectural as the total area is only imperfectly known; but the response to price changes is obvious. Quarterly figures are shown for 1930-33, but not for 1929 when the aftermath of the Stevenson Scheme still affected the position in the first half of the year.

TABLE 2. OUTPUT OF MALAYAN AND N.E.I. SMALLHOLDERS' RUBBER 1929-33

(Seasonally Corrected Figures)

	Malaya		N. E. I.		
	Total Output Tons	Output per Mature Acre Lbs.	Total Output Tons	Output per Mature Acre Lbs.	Singapore R.S.S. Price per Lb., Cents
1929	200,000	480	106,900	430	34.5
1930					
1st qtr.	51,500		27,100		25.4
2nd qtr.	49,100		27,300		22.8
3rd qtr.	49,400		18,400		15.5
4th qtr.	47,300		16,200		13.5
Total	197,300	460	89,000	245	19.3
1931					
1sr qtr.	50,300		25,000		12.4
2nd qtr.	48,300		24,400		9.7
3rd qtr.	45,300		18,900		8.4
4th qtr.	53,100		20,100		9.2
Total	197,000	445	88,400	170	10.0
1932					
1st qtr.	42,000		17,400		8.0
2nd qtr.	40,500		11,100		8.3
3rd qtr.	43,500		13,100		7.1
4th qtr.	51,000		19,900		7.6
Total	177,000	385	61,500	105	7.0
1933					
1st qtr.	40,700		14,900		6.4
2nd qtr.	57,000		26,900		8.9
3rd qtr.	58,000		33,400		12.4
4th qtr.	64,100		38,800		13.2
Total	219,800	465	114,000	165	10.2

These figures certainly do not suggest that the aggregate supply curve of rubber from these smallholders was backward-rising. It is possible, but very doubtful, that if separate figures were available for the outputs of

[10] Thus F. J. Kemlo, chairman of the Singapore Chamber of Commerce Rubber Association, managing director of Harrisons & Crosfield (Malaya), Ltd., and Malayan delegate to the Rubber Study Group, stated in his presidential address to the Singapore Chamber of Commerce Rubber Association in August, 1946:
"It is generally estimated that Malayan native production is running at 100% capacity. With the present inflation, the current price in terms of buying power is very low, and it has been amply demonstrated in the last that low prices bring out the greatest native production." (*Straits Times*, August 23, 1946).
The same opinion is expressed by P. Lamartine Yates in his book *Commodity Control* (p. 115):
"The native, like peasants everywhere, tends to produce more rather than less when the price begins to fall. . . In general the reaction to a price fall is quite insignificant; indeed, there is no experience to show how low the price would have to fall before native output was seriously curtailed."
As regards the view that the rate of production in August, 1946, (running at an annual rate of about 200,000 tons) represented capacity working for Malayan smallholders, it is worth noting that in 1947 their output was 286,000 tons; in the past smallholders at times produced at a rate of more than 300,000 tons.

[11] "Largely" rather than "wholly" since the concept of capacity working is subject to important qualifications and limitations.

[12] Some remarks about N.E.I. native production for subsequent years will be found in the concluding paragraph of this section.

Malay, Chinese, and Indian holdings in Malaya, the Malay smallholders' production would at times have shown a backward-rising tendency.

Table 3 shows the outputs of these producers in the months immediately preceding the establishment of regulation in 1934.

TABLE 3. OUTPUT* OF CERTAIN CLASSES OF PRODUCER, JANUARY-MAY, 1934

(Seasonally Adjusted Figures; Long Tons)

	Malaya		N.E.I.		Singapore R.S.S. Price;
	Estates	Smallholdings	Estates	Natives	Cents per Lb.
Jan.	19,800	17,400	13,100	15,300	14.3
Feb.	23,600	18,000	15,800	17,600	16.3
Mar.	22,100	24,000	17,600	21,300	17.2
Apr.	22,200	23,500	17,000	24,400	18.8
May	22,200	26,800	16,400	29,400	21.4

*Exports for N.E.I. natives.

The N.E.I. figures were probably affected by a reduction in stocks which took place in anticipation of regulation. But this does not affect the general conclusion which clearly emerges from the tables: there is definite qualitative evidence of correlation between price and production of smallholders' rubber.

Tables 4 and 5 summarize somewhat concisely the available data on the reaction of all major groups of rubber producers to the price changes in 1929-33. Table 4 shows output per mature acre of different classes of producers. The decline in output per mature acre after 1929 indicates broadly the extent to which producers were working below capacity, as a substantial reduction in the yield per mature acre generally indicates the postponement of tapping of areas which had come into bearing or the cessation of tapping of mature areas.[13] The yield figures are only very approximate, but once again the general trend is unmistakable.

TABLE 4. ESTIMATED OUTPUT PER MATURE ACRE OF EACH CLASS OF RUBBER PRODUCER, 1929-33

(Pound per Acre, to the Nearest Five Pounds)

	1929	1930	1931	1932	1933
Average London price (pence per lb.)	10.3	5.9	3.1	2.3	3.2
Malaya—estates	410	380	375	365	355
Smallholdings	480	460	445	385	465
Total	440	415	405	375	400
N.E.I. estates—Outer Provinces	375	365	390	360	360
Java	390	385	400	325	380
Total	380	375	395	345	365
Natives	430	245	170	105	165
Ceylon	360	350	260	210	275
Sarawak	420	225	170	85	105
British North Borneo	225	200	155	120	170
India (including Burma)	240	205	155	65	85
French Indo-China	215	175	135	120	150
Siam	275	190	100	60	110

These figures, though only estimates, are suggestive of the differences in the reaction of various classes of producer to the steep decline in the price. The supply of rubber from the estates in the Outer Provinces of Netherlands India was apparently least elastic; these estates produced at an almost constant rate through the slump. The rate of production of Malayan estates was also fairly stable. At the other end of the scale, the N.E.I. smallholders produced in 1932 only about one-quarter as much rubber per mature acre as in 1929; several of the smaller producing territories reacted in the same way. This point reflects principally the ability of the smallholders to turn to alternative sources of earnings.

The same tendency is also shown in Table 5 which has been calculated from data presented in the various "Reports on Plantation Rubber" by the late H. N. Whitford.[14] In the light of subsequent information, notably the revised figures of the N.E.I. native acreage and of Malayan smallholders' production in 1933-34 and again in 1946-47, it appears that Dr. Whitford's estimates of capacity, especially of smallholdings, were too low. This condition, however, does not affect the general argument.

TABLE 5. POTENTIAL CAPACITY (DR. WHITFORD'S ESTIMATES) AND ACTUAL OUTPUT OF VARIOUS GROUPS OF PRODUCER, 1929-33

(Thousand Long Tons)

	1929	1930	1931	1932	1933
Average Singapore R.S.S. price (cents per lb.)	34.5	19.3	10.0	7.0	10.2
Malaya					
Capacity	464	477	498	520	533
Production, quantity	446	443	437	417	461
As % of capacity	96	93	88	80	86
N.E.I. Estates					
Capacity	160	165	177	200	229
Production, quantity	151	152	164	149	170
As % of capacity	94	92	93	74	74
N.E.I. Natives					
Capacity	122	162	212	264	308
Production, quantity	107	88	87	61	113
As % of capacity	88	54	41	23	37
Ceylon					
Capacity	81	82	82	84	85
Production, quantity	80	76	62	49	64
As % of capacity	99	93	76	58	75
Sarawak					
Capacity	12	14	21	30	40
Production, quantity	11	11	10	7	11
As % of capacity	91	79	48	23	28
British North Borneo					
Capacity	9	10	11	13	14
Production, quantity	7	7	6	5	8
As % of capacity	78	70	55	38	57
India, including Burma					
Capacity	14	14	14	14	15
Production, quantity	13	12	10	4	5
As % of capacity	93	86	71	29	33
Siam					
Capacity	6	6	7	11	16
Production, quantity	4	5	4	3	7
As % of capacity	67	83	57	27	44
French Indo-China					
Capacity	11	13	15	22	28
Production, quantity	9	10	11	13	17
As % of capacity	82	77	73	59	60
TOTAL:					
Capacity	879	943	1,037	1,158	1,268
Production, quantity	828	804	791	708	839
As % of capacity	94	85	76	61	66

In the light of these various figures it is difficult to see how it can reasonably be maintained that available data suggest that smallholders' rubber production is stimulated by a fall in price.

From 1928 to 1934 the N.E.I. authorities used to publish official estimates of the capacity of the native producers. These estimates were very rough, but are of some value in indicating the trend of the changes in physical productive capacity. The publication of the estimates was discontinued after 1934, probably owing to the introduction of regulation. The native quota in 1934 was less than one-half of the last of these official estimates. In October, 1934, the leader of the N.E.I. delegation to the International Rubber Regulation Committee estimated at a meeting of the Committee that the native capacity was about 700,000 tons annually, against a quota of 145,000 tons. In Table 6 native exports are shown in absolute figures and as a percentage of the officially estimated capacity for every year for which official estimates of capacity are available.

TABLE 6. N.E.I. NATIVE EXPORTS AND BATAVIA PRICE OF RUBBER, 1927-1933

	EXPORTS		Batavia Price of Standard Sheet;
	Thousand Metric Tons	As % of Capacity	Guilder Cents per Half-Kilo
1927	100	100	99
1928	91	83	58
1929	109	90	54
1930	90	60	30
1931	89	44	15
1932	62	25	8
1933	114	38	10

These data, including the official estimates of capacity are derived from the various official "Reports on Native Rubber Cultivation" which used to be published by the

[13] In certain conditions it may also reflect changes in soil condition or in the age composition of the mature area. These considerations do not apply to such large variations as are shown in the table.

[14] A former manager of the crude rubber department of the Rubber Manufacturers' Association, Inc. (New York). His five "Reports on Plantation Rubber," issued between 1928 and 1934 by the R.M.A., contain much valuable material.

Division of Agricultural Economics in the N.E.I. Department of Agriculture, Industry and Commerce. They suggest considerable responsiveness of native production in terms of capacity working to changes in price.

From June, 1934, to December, 1936, there was no individual regulation of native smallholders in the N.E.I.; their exports were kept in check by means of a special export tax (special as distinct from the ordinary *ad valorem* tax levied on the f.o.b. value of native exports). This was designed to depress the price of native rubber in the interior sufficiently to keep exports within the permissible limits, calculated from the total native quota and the international rates of release. This method of regulation was, of course, in effect an official recognition of the fact that the supply curve of N.E.I. rubber was forward-rising as otherwise exports could not have been restricted by depressing the price. The operation of this special tax was reviewed in an article, "The Working of Rubber Regulation."[15] Unfortunately the operation of this tax does not throw much light on the relation between price and production of N.E.I. native rubber beyond the fact that it was possible to control native exports by raising the tax to sufficiently high levels. The rate of tax was generally several times the net return to the natives and was also generally higher than the price ex tax f.o.b. at native export ports; moreover, the rate varied by large discontinuous jumps. As a result, monthly exports fluctuated widely, and quarterly exports fluctuated widely, obviously under the influence of expectation of the future level of the tax, and showed little connection with price.

Over the 2½ years of the operation of the tax yearly production was approximately stable at about 150,000 tons, although in 1935 and 1936 the local prices after tax were much lower than they had been in the second half of 1934. This condition would suggest an unresponsiveness of N.E.I. native production to price changes which is quite contrary to expectations. It is also contrary to the experience before 1934; to the principle of the operation of the special export tax (which postulated a responsiveness of production to changes in the net price); it was also contradicted by the observations of the N.E.I. administrators (summarized in the official "Reports on Native Rubber Cultivation") which were generally to the effect that the rate of tapping was considerably affected by changes in the net return left to the natives. It is certain that as percentage of capacity working N.E.I. native production declined substantially after 1934, capacity increased steadily with increasing areas of the huge native acreage reaching majority. In assessing the responsiveness of production to price over this period, it should also be remembered that the most important alternative products also declined in price in the N.E.I. after 1934. Altogether the operation of the export tax suggests clearly that the supply price of N.E.I. native rubber was extremely low, a small fraction of what it had been estimated at; that in terms of capacity working the supply was almost certainly elastic; and lastly that the fact that the device could be used to control native exports is in itself evidence that production did respond to prices; beyond that no definite inference can be drawn from the experience of these years. From 1937 to the outbreak of the Pacific war individual regulation was in force, and the effect of price changes on production cannot therefore be analyzed.

The General Position of the Smallholders

Dr. Rae dealt somewhat perfunctorily with the smallholders. He implied that they were a minor and definitely inefficient class of rubber producer. This widely current view needs revision. The smallholders are not incompetent producers of rubber. They are Asiatic peasants, or Indian or Chinese owners of small or smallish properties. In Malaya their produce is barely distinguishable from estate rubber and is generally sold in Singapore at a discount of only about 2% to 4% below estate rubber. The N.E.I. native produce is of lower quality, but after remilling in Singapore, the discount against estate rubber is usually only between 5% and 10%.

The properties of the smallholders are usually untidy in appearance, which reflects partly the absence of hired labor for upkeep and is partly the result of dense planting. This latter is an economic necessity on smallholdings; the smallholder must plant very densely to obtain the maximum yield per surface unit from his small property. Contrary to what is often believed, this dense planting does not adversely affect the yielding capacity of the holdings. Dr. Rae accepted the popular but unfounded view that these properties were carelessly and very heavily tapped and therefore unlikely to survive prolonged spells of these tapping methods. So far every survey, without exception, has found that the smallholdings were not overtapped and that, when allowance is made for the large proportion of trees rested under their rough and ready system of rotational tapping, their tapping methods were not unduly severe and in no way prejudice the life expectation of the holdings. Similarly, for technical reasons, the very dense planting has been found greatly to improve the life expectation of these properties.

These various considerations should be borne in mind in view of the quantitative importance of the smallholders. In 1947 they accounted for about three-fifths of the total production. If statutory restriction is not reintroduced or other obstructions put in their way, it is very probable that their share in total output will remain of at least that order.

Malayan smallholdings in 1947 were producing at an annual rate of approximately 300,000 tons although much of their mature acreage was out of tapping. This output was substantially higher than their total quota under the international regulation scheme which was supposed to represent their capacity output. N.E.I. native production, which was affected by the political situation in the latter part of 1947, was also at an annual rate of 300,000 tons by the winter of 1946-47, and this was only a fraction of their capacity. Both in Malaya and in Netherlands India the smallholders had to contend with very substantial difficulties. In Malaya there has been an acute shortage of rice with the unofficial price 10 to 15 times the 1940 level; prices of supplies and equipment were extremely high because their distribution to smallholders was not organized; the prices of textiles and other consumer goods were also very high; in the distribution of these, too, preference was given to estate laborers as against smallholders, partly for administrative reasons. The smallholders, moreover, were also officially pressed to spend much labor and time on food cultivation. Their output at a rate substantially in excess of their quota under regulation is thus remarkable. Some of these handicaps also affected the N.E.I. native producer. Their exports, furthermore, had at times to run a Dutch naval blockade; one of the effects of this blockade was to depress greatly the internal price of rubber in Sumatra; at 300,000 tons the rate of output was roughly equal to the 1941 quota of the N.E.I. native under rubber regulation. It is quite clear that this production was a small fraction of capacity.

[15] *Economic J.*, Sept., 1946; reprinted in India Rubber World, Jan., 1947, p. 501.

TABLE 7. PRODUCTION OF NATURAL RUBBER 1946-48

(1,000 Long Tons)

	1946	1947	1948
Malay			
Estates	174	360	404
Smallholders	230	286	295
TOTAL	404	646	699
N. E. I.			
Estates	neg.	13	102
Smallholders	*175	*282	*331
TOTAL	*175	*295	*433
Ceylon	94	89	95
Indo-China	20	38	n.a.
Siam (exports)	24	53	95
Sarawak	*9	37	40
Other Asia	*26	*44	n.a.
Africa	*47	*38	n.a.
Latin America	*40	*29	n.a.
Oceania	*1	*1	n.a.
TOTAL	840	1,270	1,520

*Estimated or partly estimated.
n.a.—Not available.
neg.—Negligible.
N.B.—Exports from the N. E. I., French Indo-China, and Sarawak in 1946 greatly exceeded production owing to the shipment of stocks accumulated during the Japanese occupation.

The performance of the smallholders also bears on Dr. Rae's discussion of the concept of the average costs of efficient producers. Dr. Rae took it as axiomatic that the efficient producers were the estates whose average costs he estimated to have been about 6d. per pound in 1937, and whose productive capacity he thought in the absence of restriction to be about 400 pounds per acre. Dr. Rae did not make it clear on what criterion estates with unrestricted yields of 400 pounds per acre and costs of 6d. could be regarded as efficient producers, when smallholders could produce 500-550 pounds per acre year in year out at next to no cost. Again, by the middle of the 1930's the development of high-yielding material capable of giving annual yields of 1,200 pounds per acre was an accomplished fact, even though of only theoretical importance as new planting was prohibited, and the output of producers under the regulation scheme was restricted to something like 300 pounds per acre. But on no reasonable criterion could estate producers with an unrestricted yield of 400 pounds per acre be classified as efficient producers. The bulk of these "efficient producers" (for whom the regulation scheme secured a "reasonable return") was kept in existence only through repeated regulation schemes.

It is often overlooked that differences in costs of production, particularly when associated with such widely different methods of production as those between many estates and smallholders, reflect greater or more moderate claims by the producers concerned on the available stock or flow of real resources, principally of labor and equipment. This point seems to be neglected in the frequent references to excess capacity with which the rubber industry seems to be permanently saddled. This capacity is not homogeneous, and the operation of certain constituent elements of the total absorbs many more real resources in the production of rubber than are required when the output is derived from other producers. The indiscriminate references to excess capacity tend to obscure these issues.

The ability of the smallholders to produce rubber with such limited expenditure of real resources reflects the comparative ease of rubber growing. All phases of rubber production and planting are very simple and easy processes from the planting of the seed to the smoking of the sheets. Indeed, so easy is it to plant and maintain the trees, to collect the latex by a simple incision in the bark of the tree, and to coagulate and mangle it, that in Malaya even some of the near-aboriginal Sakais successfully produce sheet rubber.

Production and Exports of Natural Rubber 1946-48

From the beginning of 1946 onward the supplies of natural rubber forthcoming have much exceeded the expectations of most observers as well as the official estimates. This state of affairs is more remarkable as two major classes of producer, the N.E.I. estates and French Indo-China, made very little contribution to total output, while the N.E.I. natives were severely handicapped. The performances of the other producers, notably Malayan smallholders and estates, have more than made up for this deficiency. The principal figures are summarized in Table 7.

Rims Approved and Branded by The Tire & Rim Association, Inc.

RIM SIZE	June, 1949
15" & 16" D. C. Passenger	
15x3.50D	24,360
15x4.00E	161,947
16x4.25E	3,317
16x4.50E	68,061
16x5.00F	22,801
16x5.50F	11,330
16x6.00F	2,818
16x4.00E—"Hump"	10,701
16x4.50E—"Hump"	11,618
15x4½-K	66,286
16x4½-K	175,803
15x5-K	680,581
16x5-K	10,367
15x5½-K	497,139
15x6-L	131,812
15x6½-L	185,583
15x4½-K—"Hump"	355,049
15x5-K—"Hump"	109,288
15x5½-K—"Hump"	114,720
15x6-L	15,510
17" & Over	
18x2.15B	87
18x3.62F	1,398
Truck-Bus	
17x5.0	28,628
20x5.0	11,618
20x5.00S	5,247
17x5.5	9,222
15x6.0	1,587
20x6.0	71,884
20x6.00S	33,796
18x6.00T	83
20x6.00T	3,315
18x6.50T	756
20x6.50T	15,122
20x7.0	994
20x7.00T	3,360
20x7.33V	3,272
20x7.5	7,605
20x7.50V—Flat Base	362
22x7.50V—Flat Base	619
20x8.00V	4,544
20x10.0	173
Semi D. C.	
16x4.50E	1,414
15x5.50F	67,328
16x5.50F	22,853
Tractor & Implement	
12x2.50C	5,743
12x3.00D	18,542
15x3.00D	21,303
19x3.00D	27,146
21x3.00D	1,533
36x3.00D	1,215
40x3.00D	360
16x4.25KA	2,765
20x4.50E	7,461
36x4.50E	1,035
13x5.50F	2,907
18x5.50F	15,737
20x5.50F	5,565
24x5.50R	3,821
20x8.00T—S.D.C.	1,299
24x8.00T—S.D.C.	3,477
28x8.00T—S.D.C.	869
W6-24	1,490
W7-24	8,165
W8-24	789
W8H-24	26
W8-28	242
W8-34	3,050
W8-38	376
W9-24	3,652
W9-28	20,236
W9-38	4,311
W10-24	1,025
W10H-24	34
W10-28	5,163
W10-38	1,412
W12-26	1,371
W12-38	1,148
DW9-38	4,536
DW10-38	19,931
DW11-24	3,155
DW11-26	963
DW11-28	987
DW11-38	6,855
DW12-26	1,337
DW12-30	2,028
DW12-34	1,798
DW14-26	335
DW14-28	564
DW14-34	934
Earth Mover	
24x11.25	252
24x13.00	158
32x13.00	130
24x15.00	183
25x15.00	389
25x17.00	15
Industrial	
8x2.50C	77
9x4.00E	106
10x5.00F	66
TOTAL	3,172,549

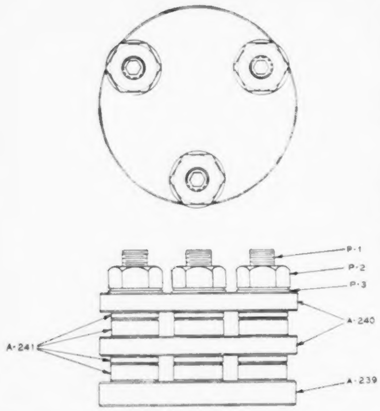


Fig. 1. ASTM D395, Method B, Compression Set Jig as Designed by Armstrong Cork Co.

An Improved Testing Jig for ASTM D395, Method B, Compression Set Determinations

F. M. Gavan,[1] C. F. Schneider,[1] and B. R. Abbott[1]

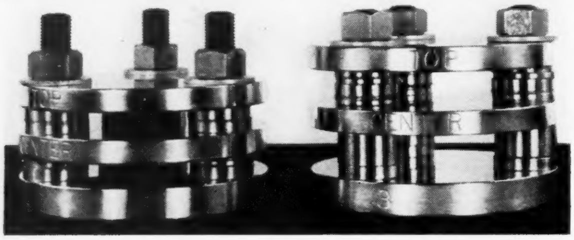


Fig. 2. Two Assembled Jigs; Test Samples in Place in Jig on Left

AS PART of the examination of the physical properties of rubber-like gasketing materials, it is frequently necessary, in the laboratories of the Armstrong Cork Co., to make ASTM compression set tests (D395-47T, Method B) on sheets of various thicknesses.

For this and several other reasons a testing jig was required which would meet the following requirements:

1. Satisfy all the particulars of Method D395 including, specifically, a hard chrome plated surface which would be durable, and with specific testing surfaces, as indicated below, finished to a maximum roughness of 10 micro inches.
2. Include a supply of improved shims (spacers) and provide a means of placing them so that precise control of the compressed thickness could be obtained.
3. Provide space for testing any reasonable thickness.
4. Provide a means of testing several samples at one time.
5. Be easy to repair to the extent that ordinary damage in use would not require the replacement of the whole unit.
6. Be sturdy, compact, and easily handled.

Accordingly, jigs were designed as shown in Figure 1 and as further illustrated in Figures 2 and 3.

The parts list is as follows:

Part No.	Material	No. Required per Unit
A-239	4-in. dia. by 5/8-in. Columbia oil die steel	1
A-240	4-in. dia. by 1/2-in. Columbia oil die steel	2
A-241	1-in. dia. by varying thickness polished drill rod	48
P-1	1/2-in.—20NF hollow set screw 3 in. long	3
P-2	1/2-in.—20NF semi-finished steel hex. nuts	3
P-3	7/16-in. brass flat washer (1.25-in. O.D. by 0.500-in. I.D. by 0.081-in. thick)	3

In using these jigs, two samples are tested at one time. Shims have been provided to allow compression to be adjusted to the nearest 0.01-inch. The brass washers (P-3) protect the top plate. The fastening screws (P-1) are removable for easy replacement when damaged.

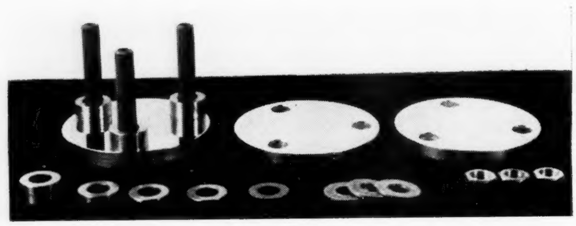


Fig. 3. One Jig Disassembled; Note Shims in Left Foreground

The following surfaces are polished to a maximum roughness of 10 micro inches: (1) the top of the bottom plate A-239; (2) both sides of the middle plate A-240; (3) the bottom of the top plate A-240.

Orientation of the plates is maintained by the markings shown in Figures 2 and 3.

All plates are heat treated to a hardness of 58-60 Rockwell C, surface finished, and then chromium plated directly on to the steel. This operation gives a surface of maximum hardness which can be renewed easily by replating.

Fifteen of these jigs have been in use in our laboratories for more than a year with excellent results.

[1] Armstrong Cork Co., Lancaster, Pa.

Compounding GR-S

(*Continued from page 581*)

better than Hi-Sil in this respect at the lower loadings, but was poorer at the high loading. Aging properties of the Hi-Sil and black loaded stocks, after four days in a 100° C. oven, were quite similar.

Hi-Sil imparts even higher physical properties to "cold rubber" than it does to regular GR-S. These data will be presented in the second part of this article which will appear in a subsequent issue.

Experimental Plantation for Peru

The Corporation Peruana del Amazonas will establish an experimental rubber plantation of 50 hectares near the Brazil-Bolivian borders, it is learned. Already two commercial scale plantations are being developed at Yurac and Yurimaguas.

EDITORIALS

Two Important and Related Decisions Face Rubber Industry

THE rubber industry in the United States is faced with the necessity of making two important and related decisions within the next few months, both of which will affect continued progress of the industry in the foreseeable future. One has to do with the position to be taken by companies in the rubber and associated industries on ratification by Congress of the Havana Charter of the International Trade Organization. The results of a discussion by leading authorities on the charter at a forum held in New York, N. Y., June 28, by The Rubber Manufacturers Association, Inc., are reported elsewhere in this issue.

The second decision is concerned with new legislation for our national policy on rubber, including disposal of government-owned synthetic rubber producing facilities to private industry. A White House questionnaire on this subject was distributed to 800 rubber, petroleum, and chemical companies on July 15. Recommendations for action by the Congress must be submitted by the President on or before January 15, 1950, since the Rubber Act of 1948 expires on July 1, 1950.

The Havana Charter and our national rubber policy are related since an international commodity agreement was written into the Charter by which the extent of production and use of synthetic rubber in the United States determined the extent to which the United Kingdom would relax restrictions on imports of United States products into its colonial areas. The United Kingdom has since requested that this agreement be eliminated from the proposed charter because of a misinterpretation by its negotiators of a technical point, but a similar agreement is likely to be requested if we ratify the Charter.

Opponents of the Charter at the recent RMA forum have certainly received support for their position in developments in the field of international trade during July, particularly as regards actions by the United Kingdom. Despite the fact that the basic principle of the proposed charter of the ITO was to stimulate world trade, British leaders have suggested price fixing for basic commodities, using Chapter VI of the Charter as the means for establishing these controls.

As the *New York Herald Tribune* pointed out in its editorial column in this connection on July 24: "That chapter is one of the group containing qualifying provisions which depart from the three key principles of the charter. . . . In proposing that only Chapter VI be enacted, Britain's leaders gratuitously relinquished the chance to affirm an intention not to confine themselves to the contractionist schemes upon which they seem to have been focussing."

Michael A. Heilperin, economic adviser of the Bristol-Myers Co., contended at the RMA forum that the Havana Charter establishes an international trading system which is almost the exact opposite to that which the United States set out to establish when launching the ITO project in 1945, and recent events in the international trade field would seem to confirm his contention. The Charter has, as yet, only been ratified by Liberia, but instead of movements to stimulate easier trade between nations, some countries are making "private" trade agreements, contrary to the spirit of the Charter.

In spite of all these facts, opponents of the ITO may be wrong, and it may be that recent trends in international trade should be considered as superficial and not basic manifestations of other countries' policies in this field. Some points made by Howard S. Piquet, moderator at the RMA forum, however, should be given serious thought by the rubber industry in deciding on its position with regard to the ITO Charter.

"Do we weaken or do we strengthen ourselves in terms of international economic influence by ratifying the charter? Because of our type of government we are not equipped to act with the same speed as countries having a parliamentary form of government. We ought to be careful to see that we are permitted to act with enlightened self-interest, and that we do not shackle ourselves by an agreement to which we shall nevertheless feel compelled, by instinct and training to live up to."

Against this background of what may possibly be an unsuccessful effort of the United States to expand world trade and employment by means of an international organization, the rubber industry is now asked to supply its opinions on future rubber policy, with special reference to whether the synthetic rubber production facilities in this country should be owned and operated by government or private industry, what the minimum quantity of synthetic rubber is that should be produced in the United States to insure national security and continuing technological advancement, and when and how to dispose of the synthetic rubber plants to private industry. The Rubber Act of 1948 has as one purpose the development of a "free competitive synthetic rubber industry" and also the termination of all regulations requiring mandatory use of synthetic rubber, but how can these purposes be achieved in face of the renewed trend toward international commodity agreements of cartel-like nature?

India Rubber World has always supported moves directed toward the expansion of world trade and a free competitive synthetic rubber industry in the United States. It appears, however, that there has been no meeting of minds among the nations in the Havana Charter, and if world trade is to be expanded through the activities of an international organization, then we should strive again, if there is still a will to negotiate, for a real agreement on the basic issues. Meanwhile, although some portions of the synthetic rubber industry have attained a firm competitive position, it is doubtful if the industry as a whole has attained a position that would satisfy minimum requirements of national security and thus permit a completely "free and competitive synthetic rubber industry", in the immediate future.

DEPARTMENT OF
PLASTICS TECHNOLOGY

Techniques for Handling Polyethylene Resins

J. K. Honish[2]

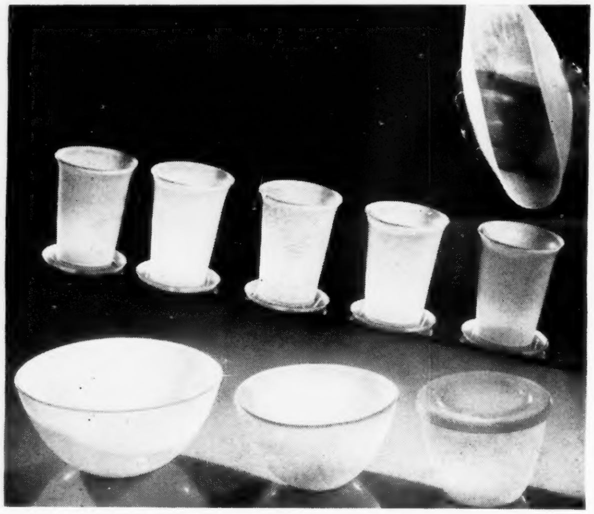


Fig. 1. Injection Molded Polyethylene Tumblers and Bowls Are Non-Breakable, Easily Cleaned, and Unaffected by Common Foods

THE development of polyethylene resins and the art of converting them into a variety of useful products is a typical example of progress by research, and the various techniques used for handling these resins is a subject of great interest to all those engaged in the plastics industry. These resins offer a combination of such unusual characteristics that they cannot help but stimulate the imagination of manufacturers and fabricators everywhere. The stream of products being made from polyethylene continues to expand dramatically.

Today one can buy dishware and kitchen containers that are tasteless, odorless, and unbreakable, to say nothing of the pleasing appearance and neatness that they provide (see Figure 1). Polyethylene films provide packaging materials for both commercial and home use that are like nothing previously offered. Bottles, closures, upholstery materials, and even drainage pipes are a few of the other diversified products that are being made available.

Historically, it was known as early as 1933 that ethylene could be polymerized to a resinous material, but these early polymers were of a grease-like consistency or else quite similar to petroleum waxes. The process for this polymerization utilized very high pressures and temperatures which made the transposition from laboratory process to large-scale production a rather difficult chemical engineering problem. Commercial polyethylene was first produced in the United States in 1942. A quite satisfactory product of high molecular weight was obtained, and its only major use was as the dielectric for high-frequency cable.

Thus, from 1942 to 1949, some seven years later, rather significant progress has been made in the production of polyethylene resins as well as in the market acceptance of their products. This gives due recognition to the outstanding properties of the polyethylene resins and the creative efforts of the sales personnel of the plastics industry.

Resin Properties

Polyethylene resins belong to the thermoplastic group of plastic products. They are permanently fusible resins, being converted by heat and pressure into a multiplicity of forms and shapes ranging from thin transparent films to thick molded sections.

In chemical structure, polyethylene resins may be described as essentially linear polymers of ethylene ranging in molecular weight from 1,000 to 40,000. The principal commercial types of polymers are the DXM medium molecular weight resins, a typical example is resin DYNM which has an average molecular weight of 21,000.

TABLE 1. SUMMARY OF PROPERTIES OF POLYETHYLENE RESINS

Molecular Type	Molecular Weight	Resin Description	Approx. Softening Temp., °C.	Viscosity at 130° C., Poises	Tensile Strength, P.S.I.	Elongation, %	Yield Strength, P.S.I.	Brittle Temperature, °C.
DXL-1	1,000	Grease	37.5	0.3				
DXL-4	4,000	Wax	93	5.2				
DXL-7	7,000	Soft resin	95	120	615	40		—14
DXL-10	10,000	Resinous	100	8×10^2				
DXL-12	12,000	(DYLT)	102	3×10^3	910	100		—18
DXL-14	14,000		104	14×10^3				
DXM-16	16,000		106	50×10^3				
DXM-19	19,000	(DYNF)	108	4×10^5			1,450	—55
DXM-21	21,000	(DYNH)	110	1×10^6	1,800	550	1,475	below —70
DXM-23	23,000	(DYNJ)		1.5×10^6				
DXH-28	28,000		112	3×10^7	2,400	575	1,600	below —70
DXH-34	34,000		112	1×10^8	3,000	625	1,800	below —70
DXH-38	38,000		112	3×10^8	3,000	625		below —70

The medium and high molecular weight polyethylene resins (DXM and DXH) are semi-rigid plastics, translucent white in color, of low unit weight, and characterized by outstanding chemical, electrical, and physical properties. In heavy sections they appear to be hard, horny-like plastics; whereas the same type of resin in a thin film can be highly transparent and flexible with the same fundamental physical, chemical, and electrical properties.

The very high molecular weight resins are tough, horny-like substances which no longer have the unctuous feel of the medium or lower molecular weight resins. The very low molecular weight polyethylene resins are greases. As the molecular weight increases, the resins become soft and balsam-like and eventually occur as semi-hard waxes and resinous materials. The physical properties of the low molecular weight resins are quite similar to those of superior-grade microcrystalline waxes. It is interesting to note that one of the outstanding uses for the low molecular weight polyethylene resins is as an additive to improve the quality of petroleum waxes.

Table 1 summarizes the significant properties of polyethylene resins as related to their average molecular weights.

Our specific interest at this time is with the various methods used for handling the different types of polyethylene resins. As such, it should be recognized that the plastics industry is concerned with the conversion of plastic raw materials into semi-finished or finished articles using the following methods: (1) bonding; (2) casting, (3) coating; (4) extrusion; (5) laminating; (6) machining; and (7) molding.

Bonding

The object of bonding is to join plastic sections together by either butt welds or lap joints, as differentiated from laminating one sheet to another. Heavy sections of polyethylene can be bonded by using either gas welding equipment or hot air, as well as by contact melt procedures for which a platen temperature of 480 to 500° F. is required. Polyethylene rods are used as the flux in welding.

The weld strength is usually 80 to 90% of the original material strength, but with more experience it is reasonable to believe that the weld strength can be made

[1]Presented before sixth annual spring conference, Pacific Coast Section, Society of the Plastics Industry, Inc., Santa Barbara, Calif., Mar. 17, 1949.

[2]Development engineer, Bakelite Corp., 30 E. 42nd St., New York 17, N. Y.

equal to the unit strength. Thin film can be heat sealed, using resistance heaters or high-frequency heating with a barrier material as the thermal contact. In either case a surface releasing agent is required to prevent adhesion of the plastic to the hot element. With heat sealing the bond strength is invariably equal to the unit strength of the material itself.

Thin films and light gage sections can be bonded with pressure sensitive cements, subject to the usual temperature limitations. The chemical inertness of polyethylene makes it practically impossible for solvent sealing to be as effective as thermal bonding.

Casting

Low molecular weight resins ranging from 7,000 (DXL-7) to 15,000 (DXL-15), with resin DYLT having a molecular weight of 12,000 (DXL-12) being representative, are of interest as hot melt or potting compounds. The lower softening temperatures and corresponding lower melt viscosities are of particular interest for many sealing applications, but due consideration should be given to the higher brittle temperatures of these resins for the service intended.

Potting operations should not be confused with the true definition of injection molding. Using the simpler factors of pouring and gravity, potting does not require the high capital investment found in injection molding equipment and does not depend on the high pressures characteristic of that method. The addition of a simple air cylinder is often sufficient for satisfactory operation speed-up of potting.

A typical potting operation, using a special polyethylene compound, is pouring the insulation around the potential coil in electric watt-hour meters. The polyethylene jacket withstands a 15-kilovolt breakdown voltage and continuous aging over temperature cycles ranging from —40 to 100° C. The economics of the operation permits the manufacturer to eliminate the customary use of multiple parts and expensive assembly operations.

Coating

Solution coatings normally use polyethylene resins of medium molecular weight, such as 21,000 (DYNH). Whereas polyethylene resins are highly resistant to most chemicals and solvents at normal ambient temperatures, resin solutions can be made with certain chlorinated and aromatic solvents at elevated temperatures. To obtain a solution having a solids content of 35% polyethylene in a solvent such as toluene, a temperature of 194° F. or higher must be maintained to keep the resin in solution. If the temperature is lowered, gelation and ultimate precipitation of the resin will result in a complete clogging of the lines.

Correspondingly lower solution temperatures are required for lower resin concentrations. Other solvents can be used, such as carbon tetrachloride, xylene, or trichlorethane, but each system will have its own solution temperature phase characteristic (see Figure 2). Removal of the solvent is accomplished by drying at 120 to 150° C., producing a surface film of optimum properties.

By use of reverse roll coaters and spreader knives, coatings can be applied to paper with good coverage, i.e., 15 pounds per 3,000 sq. ft.-ream producing a one-mil coating. The polyethylene coatings will show the usual excellent water and gas permeability characteristics of the resin and will readily lend themselves to bonding by the heat sealing method.

Hot melts make use of low molecular weight resin, 12,000 (DXL-12), for which there is no need of solvent, since the material can be applied to paper by means of a hot doctor knife at 310° F. This DXL-12 resin (DYLT) is of particular interest as an additive to up-grade paraffin wax, increasing the toughness of the paper-coated film and producing a less tacky coating which is thereby less sensitive to blocking. It is usually desirable to incorporate antioxidants in the polyethylene resins when they are used as hot melts, as is commonly done with the paraffin waxes, to inhibit oxidation at elevated temperatures. As might be expected, polyethylene resins can be applied to cloth as well as paper.

Flame spraying of polyethylene resins is used to lay down a protective coating on metal and concrete surfaces. A 50- to 80-mesh or finer granulation of resin is required to produce a smooth, dense surface at maximum efficiency. The best adherence is obtained with a clean, sand-blasted metal or concrete surface. An oxy-acetylene or propane gun system is used which will lay down a 1/32-inch coating at the rate of 25 square feet per hour, using four to six pounds of polyethylene per hour. Equipment developments which would provide greater capacity are recognized as a fundamental need in this industry.

The preferred polyethylene resins for flame spraying are the medium to high molecular weight types, such as DXM-20, DXM-22, and DXH-27. The greater toughness and high viscosities of these resins result i a more satisfactory bond to metal. This eliminates the need of modifiers to improve the adhesion of low molecular weight types, such as have been used in the past. The presence of modifying materials admixed in the polyethylene resins invariably impairs the excellent physical and chemical properties of the straight resin coating.

Extrusion

The use of polyethylene as an extrusion compound in the wire and cable industry is well known. The low power loss, low dielectric constant, high dielectric strength, and high resistivity of the resin are the reasons for this application. The excellent chemical and physical properties of the resin also gave cause for its use in cables, other than those used during the war, particularly as a replacement for lead sheathing. As an example of such use, the jacket for the new Alpeth cable of the Western Electric Co. employs black pigmented polyethylene. Similarly, profile extrusion of polyethylene has paralleled the use of this product in the wire and cable industry for coaxial cable. Other shapes for industrial and consumer use are also common.

Multiple extrusion of polyethylene colors for decorative effects can be done readily by using two or more auxiliary feeding units, as desired. The excellent heat sealing characteristics of polyethylene insure an adequate bonding of the different colored plastic flow streams. Tubular extrusion has led to surgical tubing on the one hand and, on the other, to industrial pipe of three- to four-inch diameters with ¼- to ⅜-inch walls, as well as rod stock in conventional sizes.

The production of transparent sheeting and tubing ranging from one to five mils in thickness has probably been one of the most significant extrusion developments since 1945. Tubular stock having a flat width of 36 inches is available which, when slit, results in a sheet 72 inches wide. The average sheeting, however, is approximately 40 inches wide. Smaller tubular sizes are also quite common for packaging of almost anything and everything, including use of tubing in disposable infants' nursing bottles.

For tubular extrusion, as shown in Figure 3, normal die openings of 0.010-inch are used with a hot draw at the die exit to the desired size, such as one- to two-mil sheet thickness. For thin wall tubing, controlled air pressures of one-half to two pounds per square inch are usually satisfactory. Die design requires uniform distribution of material from the head of the unit to maintain acceptable film thickness tolerances. For maximum clarity and superior low-temperature flex properties, polyethylene should be shock cooled to avoid the relatively high degree of crystallinity usually resulting from normal air annealing. Such cooling applies both to larger film thicknesses and to very thin film. For very critical low-temperature flexural or strength properties, special polyethylene compounds based on medium and high molecular weight resins are preferred.

The fundamental properties of polyethylene as a packaging film seemingly insure a tremendous future. It is a transparent film offering excellent protection against moisture and an untold number of solvents and corrosive chemicals. It also has a soft, warm feel, which is an important factor in stimulating customer interest at the point of sale. In addition, polyethylene film is not just another wrapping material, but becomes a valuable premium to the consumer because of its serviceability for many household repackaging applications.

The economics of the situation are also very interesting to both manufacturer and package designer. One pound of one-mil polyethylene film will cover 30,000 square inches of surface in packaging; while the present average gage of 1½ mils will cover 22,500 square inches. The present market for transparent packaging film has been estimated at 265,000,000 pounds a year. There should be no doubt that transparent packaging film serves an important part in the merchandising of consumer items.

A development which has been in progress for several years is the extrusion of polyethylene monofilaments having an average diameter of 11 mils. The interest in this type of product derives from the large increase in tensile strength brought about by cold drawing the monofilaments. For example, unoriented DYNH polyethylene has a unit strength of 2,500 p.s.i., which after being oriented by cold drawing increases to 23,000 p.s.i. Higher molecular weight resin DXH-28 can be extruded and oriented to a tensile strength of 34,000 p.s.i.

If the oriented monofilament is subjected to elevated temperatures, a high percentage of recovery will occur. It is therefore desirable to anneal or "set" the oriented monofilament, and this operation is usually performed continuously after the cold drawing or orientation operation at the time of extrusion. One-stage annealing will leave an average shrinkage of 7-9% at 150° F. water immersion; while two-stage annealing will reduce the average shrinkage to 1.5-2% at 150° F. and 3-4% at 165° F. The second annealing stage can be done after the fabric has been made, by using a tentering frame.

Polyethylene monofilaments have been woven, knitted, braided, crocheted, and power loomed into a variety of weaves and patterns. Field tests have shown the polyethylene fabric to have excellent wear properties both for itself and for apparel and garments coming in contact with it. Because of the slight recovery of polyethylene at elevated temperatures, poly-

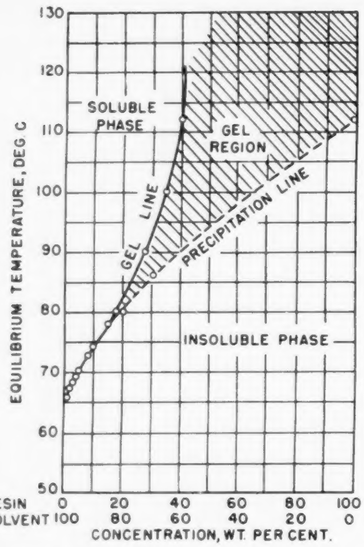


Fig. 2. Solution Temperature Phase Diagram for Resin DYNH-Xylene System

ethylene seat covers remain properly fitted and new looking, while its excellent chemical resistance keeps it fresh looking. Random cigarette ashes have not been known to affect the seat covers seriously. Deliberate attempts to char polyethylene seat covers, using a clump of hot pipe ashes, have left a minute charred hole formed by the thermal welding of the strands to each other. These holes, however, showed no fraying or change in appearance after two years of service.

Progress has also been made with polyethylene multifilaments, and, with a better supply situation, polyethylene resins will establish their own significant position in the textile field.

Laminating

The laminating of polyethylene sheets to other sheet materials depends on mechanical reinforcement, which is fundamentally an imbedding of the core material in a fused sheet of polyethylene. Thus laminations of polyethylene resins to any woven fabrics present no great problem. Temperatures of 300-350° F. and pressures of 300-700 p.s.i., with subsequent cooling to 100-130° F., will produce laminates whose surfaces will be mirror reproductions of the press platens. Both high-mirror glosses or embossed reproductions can be produced.

As might be expected, polyethylene can be laminated to itself as effectively as it can be heat sealed.

Machining

The ease of machining of polyethylene is characteristic of this class of thermoplastic resins. A sharp cutting tool edge will produce a clean surface, and the customary relief angle for proper discharge of shavings is required for twist drills or end millers. The conventional tools used for machining soft metal parts are usually satisfactory, but high frictional heat is to be avoided.

In general, machining of polyethylene is done only for model making and not as a normal manufacturing operation. Occasional exceptions exist, such as the manufacture of specialized spherical pieces subsequently trued up on a centerless grinder; such parts are most economically produced from bar stock.

Molding

Since polyethylene is a thermoplastic, the most economical method for handling it by molding is with the injection method. Because of its chemical inertness, special alloy steels are not required for either the injection cylinder or molds. The general principles established for injection molding of other thermoplastic materials apply to polyethylene. Adequate and uniform coring of the mold is desirable to control mold temperatures if the surface appearance of the molded part is to be either "frosted" or "satin smooth." Mold temperatures of 160-180° F., together with high plastic mass temperatures, will produce a "satin" finish. Proper mold temperatures are also a distinct aid in controlling differential shrinkage in the finished parts.

The fluidity of polyethylene at cylinder temperatures of 275-525° F. is the main reason for its comparative ease in molding and permits the design of parts having thinner cross-sectional areas than is conventional with most of the other thermoplastics. The readiness of polyethylene to heat seal to itself also insures a stronger welding of divergent flow streams. Polyethylene injection molding normally requires lower injection pressures than other thermoplastics (i.e., 5,000-10,000 p.s.i.).

If dimensional tolerances are not important, polyethylene can be molded on extremely short cycles. However, even with rather exacting tolerances, significant progress is being made with short cycle times. In general, polyethylene is rated as one of the more universal types of injection molding materials, with a reputation for high machine hour productivity.

The linear shrinkage of polyethylene is 3-4%, and the cubical shrinkage is about 15%. By using a balanced time, temperature, and pressure cycle on a given mold, the shrinkage factor can be reduced to 1-2%, and the product uniformly held within the tolerances of the other more commonly known thermoplastics. With large cross-sectional areas, a longer pressure dwell time is desirable to prevent cavitation. Following the practice of the industry, the overall cycle need not be unduly increased if quenching is performed at the time of discharge as a compensating operation. If critical tolerances are to be met, the use of shrink blocks should be considered.

The medium molecular weight resins, such as DYNH, are usually employed for injection molding, but the lower molecular weight resins such as DYLT, can also be used for this purpose. The same molding principles, as outlined above, apply also to the higher molecular weight resins.

Although polyethylene resins of the type commonly used for injection molding and extrusion are semi-rigid materials, certain applications occasionally require the use of a polyethylene compound of higher flex modulus or increased stiffness. Filled polyethylene compounds are available to meet this need. A comparison of the properties of filled and unfilled compounds is given in Table 2.

TABLE 2. AVERAGE PROPERTIES OF POLYETHYLENE MOLDING COMPOUNDS

	Unfilled Polyethylene		Filled Polyethylene
	DXM-DXH	DYNH	
Specific gravity	0.92	0.92	1.23
Tensile strength, p.s.i.	1,400-3,000	1,800	1,600 (average)
Elongation, %	300-650	550	60
Stiffness factor at 25° C., p.s.i., (A.S.T.M., D747-48T)	20,000	20,000	40,000
Strain release temperature, °F.	180-212	180-212	180-212
Mold shrinkage, %	0.030-0.050	0.030-0.050	0.015-0.025
Molding temperature, °F	275-525	275-525	300-525
Molding pressure, p.s.i.	5,000-15,000	5,000-15,000	5,000-12,000

Summary and Conclusions

The existence of some 4,100 injection machines in the plastics industry and the general ease with which polyethylene can be injection molded lead to the belief that the operating personnel of many plastics fabricating companies will seek to have their sales associates develop completely new lines of polyethylene products. However, one of the great misfortunes that could arise would be the development of products which are imitations, or should one say "improvements," of existing poly-

Fig. 3 Tubular Extrusion of Polyethylene Film; The Extruded Film is Traveling Upward at the Right and, after Cooling, Traveling Downward to the Conveyer Which Presses It Flat and Packs It on Rolls

ethylene products. It would be far more desirable to acquire a thorough understanding of the properties and handling characteristics of the polyethylene resins in order to stimulate the creative thinking of all concerned and thus assure leadership in the field. A brief review of the resins should serve our purpose at this time.

The commercially available polyethylene resins, as the supply and the demand allow, are the medium molecular weight types, DYNF, DYNH, and DYNJ, ranging in weight from 19,000-23,000. They are produced in natural color and in a diversified range of translucent and opaque colors. Specially compounded materials are recommended for use in film extrusion and in wire and cable.

Polyethylene resins of the low molecular weight type, such as are used for hot melts and paper coatings, are produced in commercial quantities, but on a more restricted scale. Market demand for these resins will probably establish their supply position. High molecular weight types are available at present only in development quantities.

Polyethylene resins are characterized as follows:

(1) Low specific gravity, 0.92.

(2) Unusual toughness over a broad temperature range, —70 to 180° F.

(3) Exceptional chemical and moisture resistance.

(4) Unique gas transmission; low transmission of water vapor, but high transmission of carbon dioxide, oxygen, and nitrogen.

(5) Excellent electrical properties over a broad frequency range.

(6) Odorless, tasteless, and non-toxic, unless modified by addition agents.

(7) A natural color of translucent white.

(8) Overall ease of handling, especially by molding and extrusion techniques.

(9) In general, mechanical properties are related to the molecular structure and chain length of the polymers. With increasing molecular weight, tensile strength increases to a maximum of 3,000 p.s.i.; cutting and abrasion resistance increases; form stability in boiling water increases; yield strength increases; and chemical resistance of high molecular weight resins is superior to that of low-weight types, but all classes of polyethylene resins are considered excellent in chemical resistance.

Thus the principal techniques at this time for handling polyethylene resins in the plastics fabricating industry are injection molding and extrusion, for which the present commercial grades are preeminently satisfactory. Time and the ambition of the plastics industry personnel should contribute importantly to the future of polyethylene resins.

CALENDAR

Sept. 17. Connecticut Rubber Group. Annual Outing. Scollins Grove, Long Hill, Conn.
Sept. 18-23. American Chemical Society. Atlantic City, N. J.
Sept. 21-23. Division of Rubber Chemistry, A.C.S. Chalfonte-Haddon Hall, Atlantic City.
Sept. 21. New York Section, SPE. Hotel Shelburne, New York, N. Y.
Sept. 28-30. American Society of Mechanical Engineers. Fall Meeting. Erie, Pa.
Oct. 4. The Los Angeles Rubber Group.
Oct. 7. Detroit Rubber & Plastics Group, Inc. Detroit-Leland Hotel, Detroit, Mich.
Oct. 10. Upper Midwest Section, SPE.
Oct. 10-14. ASTM. National Meeting. Fairmont Hotel, San Francisco, Calif.
Oct. 11-12. ASTM Committee C-16 on Thermal Insulating Materials. Atlantic City, N. J.
Oct. 11. Buffalo Rubber Group. Hotel Westbrook, Buffalo, N. Y.
Oct. 14. Boston Rubber Group. Somerset Hotel, Boston, Mass.
Oct. 19. South Texas Section, SPE.
Oct. 19. New York and Newark Sections, SPE. Joint Meeting. Hotel Shelburne, New York, N. Y.
Oct. 21. New York Rubber Group. Henry Hudson Hotel, New York, N. Y.
Oct. 21. Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne, Ind.
Oct. 24-28. National Safety Council. Thirty-Seventh National Safety Congress and Exposition. Chicago, Ill.
Oct. 25. Washington Rubber Group.
Nov. 1-5. Pacific Chemical Exposition & Conference. San Francisco Civic Auditorium, San Francisco, Calif.
Nov. 4. Northern California Rubber Group. Hotel Whilcomb, San Francisco.
Nov. 14. Upper Midwest Section, SPE.
Nov. 16. South Texas Section, SPE.
Nov. 17-19. ASTM Committee D-9 on Electrical Insulating Materials. Atlantic City, N. J.
Nov. 18. Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne.
Nov. 22. Washington Rubber Group.
Nov. 27-Dec. 2. ASME. Annual Meeting. New York, N. Y.
Nov. 28-Dec. 3. Twenty-Second Exposition of Chemical Industries, Grand Central Palace, New York, N. Y.

New Hermetical Terminal

A 12-YEAR search is now apparently on the threshold of successful completion as the Army Signal Corps makes final tests of new high-temperature, hermetically sealed terminals developed by Molding Corp. of America, Inc., Providence, R. I. In the past, terminal insulating materials have failed for many reasons arising from thermal shock cycling, humidity, salt water immersion, high operating temperatures, corrosion, and other factors.

The new terminal utilizes Kel-F, a trifluorochloroethylene polymer thermoplastic developed by M. W. Kellogg Co. Kel-F was found to have qualities that make it ideal for this application. Its chemical inertness makes it virtually invulnerable to any corrosive action, while its resistance to temperature over a range from —320 to 375° F. is exceptional for a plastic. This plastic also has a high resistance to electric current.

After Kel-F had been selected and the basic design of the terminal completed, Molding Corp. solved the problem of effecting a strong bond between the plastic and metals in the terminal, designed and built the mold, and perfected a molding technique. The first terminals were delivered in December, 1948, and have since been subjected to tests far more severe than those required by joint Army-Navy specifications, without a single failure. Upon completion of current qualification tests by the Signal Corps, the terminal will be available for regular orders from the molding company.

Fadeproof Vinyl Film

A SOFT, thin, and fadeproof vinyl film with exceptional tear and flame resistance characteristics is being produced in all translucent and opaque colors by Goodyear Tire & Rubber Co., Akron, O. Introduced to meet the demands of fabricators for a lightweight film for table cloth covers, drapery materials, garment bags, and the like, Goodyear's newest vinyl material is available in widths up to 54 inches.

In announcing this two-mil film, C. P. Joslyn, manager of the company's general products division, stated that it supplements Goodyear's four-, five-, and six-mil films already finding wide acceptance. Unlike the heavier materials which are produced on calenders, the new film is manufactured on two newly installed casting units. This process involves the spreading of a vinyl resin solution on an endless belt and driving off the solvents; the resulting product is a film of accurately controlled thickness, free from pinholes.

Accelerated and simulated sunlight tests to determine color fastness show the film to withstand as much as 300 hours in a fadeometer without damaging effect, as compared with the 80-hour standard established by the SPI. The new film has passed the non-inflammability specifications of the State of California, also recognized as a standard by the SPI. Thickness control of the material is achieved by a Goodyear developed gage which utilizes a radioactive form of carbon and was described in our June, 1948, issue, page 387. Like Goodyear's other vinyl films and sheeting, the new film is made from resins manufactured by a subsidiary, Pathfinder Chemical Co., Niagara Falls, N. Y.

New Heat-Transfer Liquids

NEW heat-transfer fluids with unusual resistance to sludging and coking are now in commercial production by Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y. Made from polyalkylene glycols and derivatives, the new fluids differ both chemically and in performance characteristics from petroleum oils, silicone oils, and the synthetic oils developed in Germany during the war. Experience shows these new oils to be most valuable as heat-transfer liquids in the 60-500° F. temperature range. They are characterized by low pour points, show little change in viscosity with temperature, and have a minimum effect on various types of rubber and packings. Both water-soluble and water-insoluble fluids are available in various viscosities under the registered trade mark, Ucon.

A water-soluble Ucon fluid, with a viscosity of 280 Saybolt Universal seconds at 100° F., is especially suitable for high temperature applications. Called 50-HB-280-X, this product is now being used to advantage in rubber and plastics extrusion equipment, as well as constant temperature baths. It has given long-term continuous service with no trouble from carbonization or sediment formation. This product has also been found to have a solvent effect on sludges and varnishes caused by petroleum oils. In addition Ucon 50-HB-280-X is water-soluble and can be removed from immersion heaters and other parts of heat-transfer units by cold water flushing. When a water-insoluble heat-transfer medium is preferred, Ucon LB-300-X can be used; its properties are similar to those of 50-HB-280-X.

Scientific and Technical Activities

Recent Developments in Latex Consumption

George R. Vila[1]

SINCE government restrictions on the use of natural rubber latex were removed in the spring of 1947, consumption has increased sharply. Total consumption of GR-S types of latex has remained quite constant over this period; whereas consumption of neoprene types has declined. Relative quantities consumed of each type are shown in Table 1.

TABLE 1. LATEX CONSUMED IN U.S.A.
(Long Tons—Dry Solids Content)

Year	*Hevea*	GR-S	Neoprene	Total
1946	5,724	24,810	13,603	44,137
1947	13,909	22,474	6,087	42,470
1948	28,489	23,441	4,500	56,430
1949*	29,900	22,200	3,000	55,100

* Estimated.

As will be seen from the foregoing figures, considerable neoprene has been replaced by *Hevea* latex. Relatively little GR-S latex appears to have been replaced by *Hevea*, and GR-S has apparently captured new markets to compensate for whatever ground has been lost to *Hevea*.

Table 2 shows the percentage of each type of latex being consumed over the same period. A study of these figures highlights the trends indicated in the first table.

TABLE 2. LATEX CONSUMED IN U.S.A.
Expressed as % of Total Usage

Year	*Hevea*	GR-S	Neoprene	Total
1946	13	56	31	100
1947	33	53	14	100
1948	50	42	8	100
1949*	54	40	6	100

* Estimated.

The principal uses accounting for the rapid increase in *Hevea* latex consumption are dipping, foam sponge, treatment of fibrous materials where resilience is important, and various types of adhesives.

GR-S type of synthetic rubber latex appears to be holding its own in paper applications, tire cord solutioning, and fabric backing or combining where resilience and film strength are not paramount. The principal advantages of GR-S latex are economy, better aging, and smaller particle size, an advantage in certain types of saturation.

Neoprene latex has resumed its prewar role of being used primarily where its special properties are required above all else, i.e., oil resistance, flame resistance, and sunlight resistance. Its use in such special applications is undoubtedly on the increase, and the downward trend in consumption of this latex has, in all probability, been stopped.

Latex consumed in the United States has not increased at the rate prognosticated by some forecasters immediately following World War II. Present overall usage, however, tends to fall on a normal growth curve.

World capacity to produce normal and concentrated natural latex is currently above 100,000 long tons, dry weight. With planned expansions the capacity in 1950 will be approximately 150,000 tons.

With U.S.A. total consumption for natural rubber latex in the neighborhood of 30,000 tons a year, and foreign consumption estimated at 25,000 tons, total world requirements for *Hevea* latex are approximately 55,000 tons. Thus, potential supply is well in excess of present demand; and planned expansion, as mentioned above, will increase this disparity for several years to come if present rates of consumption are maintained at their current level and do not increase.

[1]Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.

ASTM Committee D-11 Annual Meeting

COMMITTEE D-11 on Rubber and Rubber-Like Materials of the American Society for Testing Materials held a meeting at the Chalfonte-Haddon Hall Hotel, Atlantic City, N. J., July 1, as a part of the fifty-second annual meeting of the Society. The meeting of D-11 was preceded on June 29 and 30 and on July 1 by meetings of 17 sub-committees.

D-11 Meeting

At the meeting of the full committee on the morning of July 1, Chairman Simon Collier, Johns-Manville Corp., presided, assisted by A. W. Carpenter, B. F. Goodrich Co., secretary of D-11.

Mr. Collier first called for and received approval of the annual report of Committee D-11 which had been distributed in preprint form to the members. Mr. Carpenter then discussed the results of the letter ballot on the recommendations the committee would report to the Society on the afternoon of July 1. It was stated that although a few negative votes on some of the recommendations had been received, these votes were not sufficient to interfere with acceptance of the recommendations.

The matter of inviting the International Standards Organization, ISO Technical Committee 45—Rubber, to hold its 1950 meeting in the United States was next discussed, and it was voted to extend an invitation through the ASTM and American Standards Association to the ISO to hold its 1950 meeting of Technical Committee 45 in the United States next year. This meeting will be scheduled to follow a meeting of D-11, which in turn will follow the International Rubber Technology Conference planned by the Division of Rubber Chemistry of the American Chemical Society. All of these meetings are tentatively scheduled for Cleveland, O., in the Fall of 1950.

Committee D-11 has been informed by the Division of Rubber Chemistry that its crude rubber committee is not to be reactivated. In view of this fact D-11 will establish a new subcommittee to develop specifications for crude natural rubber. The chairman of D-11 was authorized to appoint a chairman for this subcommittee. Much preliminary checking with natural rubber producers, buyers and consumers and their organizations is contemplated in connection with the work of this new subcommittee.

Mr. Collier mentioned the death of two members of D-11 during the past few months and asked for a moment of silent tribute for these members, M. K. Easley, American Zinc Oxide Co., and A. C. Nixon, Fisher Body Division, General Motors Corp.

It has become apparent that there is an increasing amount of overlapping of some of the work of Committee D-9 on Electrical Insulating Materials, Committee D-11, and Committee D-20 on Plastics, and it was voted to ask ASTM headquarters to develop adequate machinery to avoid duplication of effort in such work and to insure that the proper coordination between these committees be attained.

Committee D-11 reaffirmed its decision taken at its last meeting in March in Chicago that it would not participate in the ASTM meeting in San Francisco, Calif., in October of this year.

The board of directors of the Society has decided to enter the field of the development of standards dealing with ultimate consumer goods and has asked its several technical committees for their approval of proposed changes in committee regulations which will expedite this work. Since the present requirements for balanced representation in the whole technical committee will not be feasible in this field, it is planned to establish consumer goods subcommittees in the various ASTM committees. These consumer goods subcommittees will handle proposed consumer goods standards in their respective technical committees and are to have balanced representation from consumers and producers. The consumer representatives will not necessarily have to be ASTM members. Committee D-11 voted to notify the board of directors of the support of that committee for the proposed plan.

It was announced that beginning with 1950 the Society would grant Awards of Merit, one for about each 750 members of the Society for noteworthy effort in administrative, technical, research work, etc., of special benefit to the Society. The Award does not have to be made to a member of ASTM, and Committee D-11 can nominate one person for this honor each year. It was voted that the chairman of D-11 appoint an award committee of three D-11 members to consider a nomination to be made by February 1, 1950.

Committee D-11 also voted to have a representative on Committee E-7 on Non-

Destructive Testing. This committee will develop methods of test using the techniques of absorption spectroscopy.

A conference on low-temperature testing of elastomers and plastics was held by Committee E-1 on Methods of Testing at the suggestion of D-11. R. S. Havenhill, St. Joseph Lead Co., and a member of D-11, presided at this conference and reported considerable progress in coordinating the work of several committees interested in this type of testing.

Subcommittee Meetings

The reports of the chairmen of the various D-11 subcommittees that held meetings at Atlantic City were as follows:

SUB. 2—BELTING, M. G. Schoch, Jr., Hewitt-Robins, Inc., chairman. This subcommittee, which is being reactivated, decided to survey by a questionnaire the need of revision of the methods of testing flat rubber belting, ASTM Method D-378. The method for making adhesion tests of belting were given particular consideration at the meeting, but it is believed that more extensive changes in these general methods may also be desirable.

SUB. 3—THREAD RUBBER, J. J. Allen, Firestone Tire & Rubber Co., chairman. The first draft of proposed specifications for the testing of thread rubber were reviewed. Suggestions for revision were made, and the specifications will be revised and circulated among the members of the subcommittee for approval.

SUB. 4—RUBBER PROTECTIVE EQUIPMENT, Gordon Thompson, Electric Testing Laboratories, Inc., chairman. The subcommittee reviewed the specifications for rubber insulating line hose, insulator hoods, insulating blankets and sleeves mentioned in the minutes of the March Chicago meeting and approved by letter ballot for publication. Some editorial changes were agreed upon, and it was decided to add a footnote to the sleeve specification covering the procedure for the proof-voltage test. The section working on revision of the specification for electrical workers' rubber gloves, D-120-40, has found that the higher voltages at which these gloves may be used necessitates standards for three grades in place of the present two. It was estimated that the revision of this specification to include the additional grade will not be completed before the first of the year.

SUB. 5—INSULATING WIRE AND CABLE, J. T. Blake, Simplex Wire & Cable Co., chairman. A number of clarifying changes in Method D-470 were adopted, and other specifications were changed to increase the rating of #16 and #18 insulated wires to 600 volts. There was considerable discussion of the physical tests on insulation that has been through more than one cycle of vulcanization, but no decision was reached, and the subject will be investigated further.

The photo-electric method for ozone determination was adopted, and a new schedule for mandrel diameters for such tests was approved. Studies were started on the shielding of high-voltage cables, resampling procedures, the testing of thin jackets, and Butyl rubber insulation specifications.

Although new definitions of immersion testing oil have been approved by letter ballot, it was requested that these be deleted from D-470, and ASTM oil #2, as specified in D-471, be substituted in the interests of simplicity, subject to a retroactive letter ballot.

There is a possibility that this subcommittee will hold a fall meeting, it was said.

SUB. 6—PACKINGS, F. C. Thorn, Garlock Packing Co., chairman. Further work by the section on corrosion testing of compressed asbestos sheet packing has confirmed the previous findings that corrosion is not characteristic of compressed asbestos sheet even at elevated temperatures. A method of test for seal aging was recommended for adoption as a tentative standard. The section on relaxation in compression has been reorganized and will make a preliminary survey and report on available relaxation testing equipment in the near future.

SUB. 7—RUBBER LATICES, G. H. Barnes, Goodyear Tire & Rubber Co., chairman. Methods for the determination of the chemical stability of latices were discussed, and two methods selected for further investigation. A report of a survey of industry methods for the determination of the viscosity of latices was submitted and discussed. This report recommended that the Brookfield viscometer be considered as a replacement for the capillary tube-type now included in the proposed specification for latices. It was further recommended that the Proposed Specifications and Methods of Test for Concentrated, Ammonia Preserved, Creamed and Centrifuged Natural Rubber Latex be adopted as tentative standards and also be submitted to The Rubber Manufacturers Association, Inc., for its consideration. The subcommittee also plans to start work on methods of testing the physical properties of latex films.

SUB. 8—NOMENCLATURE AND DEFINITIONS, Harry L. Fisher, U. S. Industrial Chemicals, Inc., chairman. There was no meeting of this subcommittee, but a letter from Dr. Fisher, promising a report on nomenclature and definitions for rubber within a year, was read.

SUB. 10—PHYSICAL TESTS, L. V. Cooper, Firestone, chairman. The revision of D-412 was discussed in detail. In order to make the necessary changes in this specification it was recommended that it be changed from an established standard to a tentative standard, after which change the revisions could be incorporated in it. Among the items included in the final revision were the use of the term "tension set" instead of "permanent set," the use of the new tension test dies as alternates to the existing dies, the retention of the rate of travel of the testing machine grip at 20 inches per minute, the accuracy of the dial readings of the tension testing machine at 10, 20, and 50% of capacity to be specified as within ½% of the true dead weight load, and the definition of the standard conditions for testing as those specified in the revised Federal Specification ZZ R601.

SUB. 11—CHEMICAL ANALYSIS, W. P. Tyler, B. F. Goodrich Research Center, chairman. No formal meeting of this subcommittee was held, but the chairman reported that, as the result of informal discussions, further plans for the revision of D-297 were organized. The section on copper and manganese analysis was enlarged, and work on the analysis for carbon black in rubber discussed. It has been decided to investigate solvents for rubber in order to find a better one for the solvent method of chemical analysis of rubber products.

SUB. 15—LIFE TESTS, G. C. Maassen, R. T. Vanderbilt Co., chairman. The section on methods of test for the aging of vinyl plastics reported that it was represented at meetings of Committee D-20 at Atlantic City, and, as a result, it had decided that the work of D-20 on this subject was so well advanced that the section should await the completion of that work before proceeding further. There was some disagreement with this conclusion, but a representative of D-20 present stated that that committee would cooperate fully with D-11, and on this basis the original conclusion was reaffirmed.

Much discussion took place on the need of the revision of the specifications for the oxygen and the air bomb aging tests, with special reference to the need of a new heating medium that would not involve explosion hazards because of its organic composition in contact with oxygen at elevated temperatures. It was voted to include in the specifications a warning against the use of organic fluids as a heating medium in the oxygen bomb test. A new section was appointed to investigate the problem of complete immersion of the oxygen bomb during aging tests. A motion to investigate various types of heating mediums was passed, as was a motion to include a warning against using the oxygen and the air bombs interchangeably in the specifications.

The section on ozone aging reported that a round-robin test had been concluded, but the agreement between laboratories on the end point for this test had been poor. Estimation of the relative resistance of the stocks tested to ozone by the various laboratories had been fairly good, but the determination of the end point for a given stock had differed a great deal.

It was reported that a creep test is now considered to offer the greatest promise for rapidly determining the aging characteristics of natural and synthetic rubbers, and plans were made to study this type of test further.

SUB. 17—HARDNESS, SET AND CREEP TESTS, S. R. Doner, Raybestos-Manhattan, Inc., chairman. The revision of D-676 on hardness was completed and recommended for adoption. A proposed revision of D-395 on compression set to include a heating period of 70 hours at 100° C. (212° F.) was recommended for letter ballot. Development of a creep test is to be worked out in cooperation with subcommittees 6 and 15, both of which are interested in this type of test.

SUB. 18—FLEXING TESTS, B. S. Garvey, Jr., Sharples Chemicals, Inc., chairman. A proposed revision of the method of test using the du Pont flexometer was recommended for letter ballot. An editorial change in the definition of the end point for the method using the Ross-Emerson flex tester was also recommended.

SUB. 19—IMMERSION TESTS, R. M. Howlett, Enjay Co., chairman. The aircraft industry is using a shrinkage test on rubber samples after immersion in gasoline which involves drying the gasoline-soaked rubber in an oven for 24 hours at 158° F. This is a dangerous procedure, and explosions have resulted in some cases. The subcommittee plans to work on a more suitable procedure.

SUB. 20—ADHESION TESTS, L. E. Cheyney, Pollock Paper Corp., chairman, and SUB. 21—CEMENTS, J. F. Anderson, B. F. Goodrich Co., chairman. Because of doubt regarding the scope of these two subcommittees, a joint meeting was held at the suggestion of Dr. Cheyney. A tabulation of existing ASTM standards relating to adhesion of organic materials showing the committee having jurisdiction over each method and including a brief discussion of the method was submitted by Dr. Cheyney. The overlapping of Committee D-14 on Adhesives and subcommittee 21 on certain subjects will require clarification. Formation of a section on tests for brake bonding cements was authorized, and a new section on specifications, defi-

nitions, and nomenclature was also formed.

It was proposed that the title of subcommittee 21 be changed to "Rubber Cements and Related Products."

SUB. 22—CELLULAR RUBBERS, H. G. Bimmerman, E. I. du Pont de Nemours & Co., Inc., chairman. No meeting of this subcommittee was held, but the chairman reported that the letter balloting on the proposed Tentative Specifications and Methods of Test for Latex Foam Rubbers and Tentative Specifications and Methods of Test for Sponge and Expanded Cellular Rubber Products had been favorable except for minor suggested editorial changes.

SUB. 23—HARD RUBBER, H. J. Flikkie, Goodrich, chairman. The round robin tests by the section on physical tests has been completed, and the results were circulated at the meeting. Agreement between laboratories on tensile strength was fair, but on elongation tests the agreement was not good. The section on asphalt containers met separately. Methods of making impact tests are to be investigated, and a revision of the bulge test method, in D-639, is to be prepared. Also, the section of the acid absorption test permitting the sealing of cut edges of test specimens is to be deleted.

SUB. 24—COATED FABRICS, S. H. Tinsey, R. T. Vanderbilt Co., chairman. The section on scrub and flex tests reported that the du Pont flexing machine requires mechanical changes in order to make duplication of results possible. The Stoll abrader was demonstrated by its inventor as a machine applicable to a wide variety of tests. Further work with this machine is to be conducted. L. Bohr, of the Philadelphia Quartermasters Depot, reported on tests on coated fabrics being made by the Society for the Plastics Industry, using the American Seating Co.'s edgewear testing machine.

SUB. 25—LOW TEMPERATURE TESTS, R. S. Havenhill, St. Joseph Lead Co., chairman. The recommendation made at the March meeting in Chicago that ASTM D-736 (Thiokol Bent Loop Test) be dropped as an ASTM standard resulted in three negative votes on the letter ballot. After some discussion it was voted to confirm the original recommendation to withdraw D-736.

The Graves solenoid brittleness tester and the du Pont solenoid brittleness tester, two units which are in common use, for which there are no standard ASTM procedures, were described by F. L. Graves, American Cyanamid Co., and N. Keen, of du Pont. The Graves apparatus was previously described in the October, 1943, and January, 1946, issues of INDIA RUBBER WORLD, and the du Pont tester in *Industrial and Engineering Chemistry (Anal. Ed.)*.[1] The Graves tester is now manufactured by Scott Testers, Inc., and the du Pont tester by Precision Scientific Co. It was mentioned that round robin tests of the various brittleness testers were being made by Rock Island Arsenal and that Committee D-20 was starting a similar testing program. A section was appointed to investigate the necessary changes in wording required to incorporate the use of the Graves and the du Pont apparatus in D-746. The section will coordinate its action with that of Committee D-20.

SUB. 26—PROCESSIBILITY TESTS, Rollo Taylor, United States Department of Agriculture, chairman. The method of test for degree of scorch using the Mooney viscosimeter, as proposed by A. E. Juve, Goodrich Research Center,[2] was discussed with special reference to the measurement of temperatures, the use of the small and large rotors, etc., and plans were made for the preparation of a tentative standard as soon as decision can be reached on standardization of the method of measuring the temperature of the specimen in the Mooney apparatus. The importance of humidity control was also covered, and the new specification is to be limited to the determination of scorch only and is not to include the use of the data for the calculation of cure rate. A note covering temperature measurement of the specimen in D-927-47T is to be added. Accurate control of the specimen temperature is of particular importance in the testing of Butyl rubber.

[1] 16, 588 (1944).
[2] INDIA RUBBER WORLD, 117, 2, 216 (1947).

Plasticizing New Polymers

APPROXIMATELY 40 members and guests of the Northern California Rubber Group attended a regular dinner-meeting on June 30 at the Hotel Claremont, Berkeley. Speaker was F. S. Rostler, Golden Bear Oil Co., who discussed "A Chemical Approach to Plasticizing New Polymers."

Dr. Rostler pointed out that plasticizing is not only the first step in compounding a new polymer, but also the first major difficulty encountered. The selection of proper plasticizers is therefore an important factor for compounders. With petroleum products, physical characteristics in use were originally developed for properties which are only of subordinate interest in rubber compounding. Typical of such properties are viscosity index, viscosity-gravity constant, and flash point. Since these characteristics are not descriptive of behavior in rubber, the selection of suitable petroleum plasticizers had to be done by the trial and error method. Now, however, a method of defining petroleum products on the basis of a quantitative analysis in terms of percentage composition of five basic groups of components gives exact prediction of performance in rubber with a much less cumbersome procedure.

The speaker also considered the properties and uses of Golden Bear petroleum products for rubber compounding. Various methods of incorporating carbon black, and the question of premixing black with plasticizers were likewise covered by Dr. Rostler, who used slides to illustrate his talk.

In the business session, awards were presented to winners in the Group's annual golf outing, held that afternoon at Richmond Golf Club, as follows: George Farwell, Fred Swain, and Ed Coxhead, all of Goodyear Rubber Co.; Leo Eneboe, American Rubber Mfg. Co.; Bill Snyder, R. T. Vanderbilt Co.; Rolf Hassarud, Food Machinery Corp.; John McSparran, C. P. Hall Co.; Stanley and John Mason, both of Pioneer Rubber Mills; Russ Kettering and Ed Munier, both of Oliver Tire & Rubber Co.; Clint Vincent, Connecticut Hard Rubber Co.; and Wayne Shipley, Tire Center.

Herman Jordan, E. I. du Pont de Nemours & Co., Inc., reported on plans for the Group's meeting on November 4, in the Hotel Whilcomb, San Francisco, in conjunction with the Pacific Chemical Exposition. The afternoon session will feature a series of short talks on plastics, latex, insulated wire, hose and belting, molded items, and other topics of interest designed to acquaint consumers of rubber products with the variety of items manufactured on the West Coast. The dinner meeting will feature a talk by Leonard K. Firestone, president of Firestone Tire & Rubber Co. of California.

Mr. Kettering also gave a report on plans for the Group's annual summer outing, to be held some time during the third week in August at Tilden Park, Berkeley.

New Chemicals Available

THE availability of beta-chloropropionic acid and beta-mercaptopropionic acid in experimental quantities has been announced by the B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O. These chemicals may have valuable properties, as offered, and may also be used as intermediates for the synthesis of new and unusual chemicals.

Beta-chloropropionic acid undergoes the usual reactions of carboxylic acids such as esterification, amide formation, and salt formation in addition to the reactions possible with the active chlorine. It is available as a white crystalline water soluble solid, melting at 36-39° C.

Beta-mercaptopropionic acid is available for the first time to the chemical industry. It reacts both as a carboxylic acid and as a mercaptan. With a purity of approximately 99%, it is available as a water soluble liquid distilling at 114-115.5° C. at 13 mm.

Rubber Division Fall Meeting

THE fifty-fifth meeting of the Division of Rubber Chemistry of the American Chemical Society will be held in conjunction with the one hundred and sixteenth meeting of the parent Society in Atlantic City, N. J., during the week of September 18. The Rubber Division will meet on September 21, 22, and 23, with the first session starting at 2:00 p.m., Wednesday, September 21. The Division headquarters will be Chalfonte-Haddon Hall.

H. I. Cramer, Sharples Chemicals, Inc., chairman, will open the Rubber Division program on Wednesday afternoon and preside at the banquet to be held on Thursday evening. There will be no regular suppliers' cocktail party preceding the banquet at this meeting.

A luncheon-meeting of the Division's 25-Year Club will be held, but the date had not been selected at this writing. John Coe, Naugatuck Chemical Division, United States Rubber Co., is chairman for this luncheon-meeting.

The technical program will consist of about 18 papers to be presented on the afternoons of September 21, 22, and on the morning of September 23. The morning of September 22 is left open for visiting sessions of other Divisions of the Society.

Lawrence K. Youse, L. H. Gilmer Division, U. S. Rubber, is chairman of the local committee and has so arranged matters that while all the activities of the Division will be centered at Chalfonte-Haddon Hall, frequent bus service will permit those who so desire to go quickly to the Auditorium in cases where they wish to listen to papers of other Divisions.

Further details including abstracts of the papers to be presented before the Rubber Division will appear in our next issue.

Groups Enjoy Summer Outings

APPROXIMATELY 400 members and guests of the Boston Rubber Group attended the annual outing on June 24 at United Shoe Country Club, Beverly, Mass. Dinner in the evening under a "big top" followed an afternoon of sports activities, including a golf tournament with some 175 participants, softball, horseshoe pitching, tennis, darts, and bowling.

Among the prize winners in the golf tournament were: kicker's handicap, R. B. Patterson, Hood Rubber Co.; low gross, A. E. Nelson, Hood; low net, L. L. Longworth, Monsanto Chemical Co.; nearest to pin on sixth hole, C. J. Reckles; longest drive on eighteenth hole, A. R. Loosli, Calco Chemical Division, American Cyanamid Co.; highest score on sixth hole, A. G. Richards, Dewey & Almy Chemical Co.; highest net score, A. T. Johnson; and highest gross score, Fred DeBaggio, Hodgman Rubber Co. The Stedfast Rubber Co. team captained by T. Freeman was victorious in the softball tournament; while prizes in other sports were won by the following: horseshoe pitching, P. L. Blanchard, Hood; tennis, John LaBelle, Koppers, Inc.; darts, E. Pease, Sun Oil Co.; and bowling, M. J. Washburn, Emery Industries, Inc. Door prizes were also distributed to everyone in attendance.

The outing was held to be highly successful, and due credit given to the committee in charge, headed by John Andrews, Godfrey L. Cabot, Inc., and assisted by Edward Covell, Stedfast Rubber and Harry Atwater, Hood.

Golf Highlights Rhode Island Group Outing

The annual summer outing and golf tournament of the Rhode Island Rubber Club took place on June 16 at the Pawtucket Golf Club, Pawtucket. Some 119 members and guests of the Group were present at the evening dinner; while 55 took part in the afternoon golf tournament.

Through the contributions of some 55 rubber and supplier companies, door prizes were awarded to all attending the outing; while golf prizes were won by the following: kicker's handicap, Patrick Graham, E. H. Kroepel, C. K. Williams & Co., and William McGuire, United Carbon Co.; low gross, the Club's secretary, F. V. Newman, Respro, Inc., and E. Colligan; most 5's, O. C. Kees, Sherwin-Williams Co.; most 6's, Harry Wilcox, Fibre Leather Co.; most 7's, B. Blecharzvk, Davol Rubber Co.; nearest to No. 7 pin, H. S. Royce, Boston Woven Hose & Rubber Co.; nearest to No. 15 pin, E. L. Hanna, Davol Rubber; high gross, H. Stoeckel; and high net, N. Cooperman.

Detroit Affair Attracts 240

Despite very hot and humid weather, the Detroit Rubber & Plastics Group, Inc., held a highly successful summer outing on June 24 at the Forest Lake Country Club, Pontiac, Mich., with 240 members and guests attending. More than 140 participants in the golf tournament were given a musical send-off at the first tee by the familiar German Band, but the hot sun proved too much for most of the contestants after nine holes of play.

Entertainment was provided during the evening dinner, which was followed by drawings for door and other prizes and the awarding of prizes to winners in the golf tournament. F. W. Stear, F. E. Toonder, and R. W. Johnson, Elkhart Rubber Works, received prizes in the kickers handicap; first and second prizes for the longest drives went to J. H. Kearns and R. W. Chamberlain, respectively; and the jackpot prize was taken by P. McGovern and T. H. Bell.

A special prize, a television set, was won by Elmer Pantea, Briggs Mfg. Co.; while nearly 50 door prizes, many donated by rubber and supplier companies, were awarded to the lucky ticket holders.

Quebec Group Has Golf Tourney

The Quebec Rubber & Plastics Group held its annual golf tournament on June 17 at Granby, P. Q. The afternoon tournament was followed by a cocktail hour and dinner at the Granby Hotel, with some 100 members and guests attending. Because of the generosity of the rubber and supplier companies in donating prizes, practically every contestant in the tournament was awarded some kind of prize. Arrangements for the outing were made by Arthur Bell, St. Lawrence Chemical Co., and Norman Burnett, H. L. Blachford, Ltd.

Election of officers for the coming year took place after dinner, with the following results: chairman, Arthur Bales, British Rubber Co. of Canada, Ltd.; and secretary-treasurer, Harry Kushnarov, Dominion Rubber Co., Ltd. Arthur Pinard, Canadian Resins & Chemicals, Ltd., and Herbert Harrington, Dominion Rubber, were elected to the Group's executive committee.

ASME Fall Meeting

THE Rubber & Plastics Division of the American Society of Mechanical Engineers will hold a one-day meeting in connection with the fall meeting of the Society, on September 28, in Erie, Pa. The Division meeting will consist of one technical session on rubber and one on plastics. The headquarters hotel will be the Lawrence.

D. H. Cornell, of the B. F. Goodrich Research Center, Brecksville, O., is chairman of the Rubber & Plastics Division.

The titles of the papers to be presented and their authors follow:

"Recent Developments in Rubber and Plastics Machinery," by Donald Chase, Farrel-Birmingham Co., Inc., Ansonia, Conn.

"Development of Machinery for the Curing of Tires," L. E. Soderquist, McNeil Machine & Engineering Co., Akron, O.

"Time as a Process Variable," by J. S. Detwiler, Taylor Instrument Cos., Rochester, N. Y.

"Strength-Variance Studies of Plastics," W. J. Gailus, Massachusetts Institute of Technology, Cambridge, Mass.

"Effect of Fuel-Immersion on Laminated Plastics," W. A. Crouse, Margie Carickhoff, and Margaret A. Fisher, National Bureau of Standards, Washington, D. C.

"Five Laminated Plastics under Creep, Fatigue and Static Loads," Prof. W. N. Findley, University of Illinois, Urbana, Ill.

It should be noted that the first three papers which comprise the rubber part of the program are somewhat different from those usually presented before meetings of the Rubber & Plastics Division, in that they deal with the machinery and equipment used to process rubber rather than reporting on its engineering properties. The paper by Mr. Soderquist, of McNeil, will be in the form of a moving picture and will include information on this company's newly developed Bag-O-Matic type of individual tire curing presses.

Chemical Industries Exposition

ORGANIZATION of the twenty-second Exposition of Chemical Industries, to be held in Grand Central Palace, New York, N. Y., November 28 to December 3, has been completed on a scale rivaling any previous enterprise of its kind. All available exhibit space on four floors of the Palace will be required to accommodate the growing list of exhibitors. Exhibits will be composed of raw materials, machinery, and products covering every recognized industrial and commercial application of chemical materials.

E. R. Weidlein, director of Mellon Institute, is chairman of the advisory committee which is composed of leaders in the major fields of interest which the exhibitors represent. The exposition is under the management of Charles F. Roth, with E. K. Stevens as associate manager.

Welding Avoids Plant Shutdown

A TIE-UP in rubber production that would have cost thousands of dollars was recently avoided in an Akron plant by prompt and efficient maintenance welding. This plant uses a 150-h.p. motor to drive four rubber mills through speed reduction gears. The 10-inch wide pinion gear broke a tooth and rendered further operation impossible. Since a new part could not be delivered in less than 30 days, it was necessary to rebuild the gear. The pinion was machined down, and the teeth were then built up with Bronzo-Chrom 185FC, a flux-coated rod produced by Eutectic Welding Alloys Corp., New York, N. Y. The repair took three days, and the new gear is now in operation with excellent results.

Creates New 1 Plus RSS Rubber

PEPTON 22 plasticizer incorporated into natural rubber latex prior to coagulation at the plantation was first tried out two years ago with such encouraging results that several hundred tons have since been made up and thoroughly evaluated.[1] This fact is responsible for the creation of a new standard of rubber bearing the trade name of No. 1 Ribbed Smoked Sheets—Plus, according to the Calco Chemical Division, American Cyanamid Co. Rubber manufacturers, in specifying this grade, it is claimed, are assured of a saving of at least 50% in breakdown time and the finest rubber produced by the plantation rubber industry.

Shipments of Pepton 22 Dispersion are now available in Singapore through the company's sales agents, East Asiatic Co., Ltd. Natural rubber producers who will have No. 1 Plus RSS available for shipment from the East within the next three months are Harrisons & Crosfield, East Asiatic Rubber Estates, etc.

[1] See our July, 1949, issue, p. 459.

RUBBER WORLD

NEWS of the MONTH

White House Distributes Rubber Policy Questionnaire; Du Pont Replies to Justice Department Suit

John R. Steelman, Presidential assistant, in a letter during July to 800 companies in the rubber, petroleum, and chemical industries, asked for answers to a number of questions on synthetic rubber consumption and plant disposal. An Interagency Working Committee on Rubber Legislation under Robert C. Turner of the White House staff, has been formed to assist in preparation of legislation that the President must submit to Congress on these subjects on or before January 15, 1950.

In a letter to stockholders and customers, Crawford H. Greenewalt, president of E. I. du Pont de Nemours & Co., Inc., refuted many of the charges brought against that company, United States Rubber Co., and General Motors Corp., by the Justice Department in its suit filed in Federal District Court in Chicago on June 30. Herbert E. Smith, chairman of the board, U. S. Rubber, also issued a statement on this subject on June 30.

At a meeting of the Rubber Division, Office of Domestic Commerce, United States Department of Commerce, with its Industry Advisory Board, a reduction in the mandatory consumption of synthetic rubbers was approved, and a revision of the R-1 Order is to be made in the near future to implement this decision.

A reduction of from 5% to 7½% in the prices of truck and bus tires and tubes by major manufacturers of these products was announced during July.

The URWA union is collecting a one-million dollar "economic defense fund" in connection with its campaign for wage increases and pension funds for its members.

White House Action on Rubber Policy

The White House through John R. Steelman, on July 15 sent a letter and questionnaire to about 800 companies in the rubber, petroleum, and chemical fields in connection with the requirements of the Rubber Act of 1948 which requires that the President shall submit to the Congress his recommendations for disposal of government-owned synthetic rubber producing facilities, together with such other recommendations as he deems desirable and appropriate, on or before January 15, 1950.

It was announced that an interagency advisory committee to assist in the preparation of the recommendations had been formed under Robert C. Turner, of the White House staff. It was requested that the questionnaire be returned to Mr. Turner by August 12 in order that his committee might have the benefit of the industry's comment.

The questionnaire consisted of three major parts, one dealing with GR-S, one with Butyl, and one with general rubber policy. It is reproduced herewith:

A. General-Purpose Synthetic Rubber (GR-S)

1. What, in your opinion, is the minimum quantity of general-purpose synthetic rubber (GR-S), if any, (either total tonnage or proportion of total new rubber consumed) that must be produced and consumed annually in order to provide continuing technological advancement in the production and utilization of GR-S?
2. Assuming total active and standby capacity of 600,000 long tons of GR-S, (including facilities for feed stocks), what, in your opinion, is the minimum quantity, if any, of GR-S (either total tonnage or proportion of new rubber consumed) that must be produced and consumed annually in order to insure rapid expandibility of production and utilization of GR-S in the event of a national emergency?
3. Assuming present levels of total consumption of new rubber, how much GR-S do you believe would be consumed annually on a completely voluntary basis if the price of *average* grades of natural rubber over a reasonable period of time were: (a) Approximately 2¢ above GR-S. (b) Approximately the same as GR-S. (c) Approximately 2¢ below GR-S. (d) Approximately 4¢ below GR-S. (e) Approximately 6¢ below GR-S.
4. Should facilities for the production of GR-S (including butadiene facilities) be owned and operated by the government or by private industry: (a) Assuming government regulations covering consumption of GR-S. (b) Assuming no such regulations.

B. Butyl Rubber

5. Assuming present levels of total consumption of new rubber, how much Butyl do you believe would be consumed annually on a completely voluntary basis if the price of *average* grades of natural rubber over a reasonable period of time were: (a) Approximately 2¢ above Butyl. (b) Approximately the same as Butyl. (c) Approximately 2¢ below Butyl. (d) Approximately 4¢ below Butyl. (e) Approximately 6¢ below Butyl.
6. Should facilities for the production of Butyl be owned and operated by the government or private industry? (a) Assuming government regulations covering consumption of Butyl. (b) Assuming no such regulations.

C. General

7. Assuming that government regulations are necessary to support production and minimum consumption of synthetic rubber, what are your views on each of the following methods? (a) Active specification controls (The method embodied at present in Allocation Order R-1 of the Department of Commerce). (b) Standby specification controls (To become effective only if and when overall rate of synthetic rubber consumption falls below the stated minimum). (c) Mandatory purchase (Manufacturers of rubber products would be required to purchase synthetic rubber in amounts equal to a stipulated proportion of their purchases of natural rubber). (d) Some form of government subsidy (Please specify the type of subsidy which you recommend). (e) A tariff on natural rubber. (f) Other, including combinations of the above. (Please specify).
8. Would the disposal plan outlined in the "Report with Respect to the Development of a Program for Disposal of the Government-Owned Rubber-Producing Facilities" submitted to the President and Congress by the Reconstruction Finance Corp. on April 1, 1949, provide a satisfactory method of disposal of plants to private industry? (a) Specifically would the plan result in an adequate supply of synthetic rubber to consumers? (b) The Rubber Act of 1948 has as one purpose the development of a "free competitive synthetic rubber industry." The RFC report, in furtherance of this purpose, states as principles of disposal that "all prospective purchasers or lessees should have equal opportunity to acquire the Government-owned facilities" and that "the Government-owned facilities should be sold to as many segments or types of American industry as possible." What are your comments on these principles and your suggestions for effectuating this purpose of the Act in actual disposal operations? (c) What specific suggestions do you have for changes in the disposal plan as outlined in this report?

Explanatory notes on questions 3 and 5 accompanying the Steelman letter were as follows:

"The term 'the price of average grades of rubber' means the average price of all natural rubber imported into the United States. (This may or may not be the average price of the grades used by your company. It is estimated that in 1948, during which the average spot price at New York for RSS No. 1 was 22.01¢ per pound, the average price of all natural rubber imported was 18.56¢.)

"The term 'present levels of total consumption' means a consumption of new rubber approximating 1,000,000 tons per year."

Members of the Steelman Interagency Working Committee on Rubber Legislation are: Mr. Turner, chairman; Arthur Wolf, National Security Resources Board; Donald Kennedy, State Department; Frederick D. Bates, Jr., National Military Establishment; John C. Stedman, Justice Department; Earl W. Glenn, Commerce Department; Charles Stewart, Labor Department; G. H. Gilbertson, Agriculture Department; Carroll Fentress, Interior Department; Wilbert G. Fritz, Bureau of Budget; Paul T. Homan, Council of Economic Advisers; Gerald Hadlock, RFC; Irving Gumbel, General Services Agency; and Corwin D. Edwards, Federal Trade Commission.

Du Pont, U. S. Rubber, General Motors Suit

The Department of Justice on June 30, in Federal District Court in Chicago, filed an anti-trust suit against E. I. du Pont de

Nemours & Co., Inc., United States Rubber Co., General Motors Corp., and about 100 individuals, including leading members of the du Pont family, charging violation of the Sherman and Clayton anti-trust laws.

The chief objective of the suit is the disposition by du Pont of its 10,000,000-share investment in General Motors. This $560,000,000 investment represents 23% ownership in General Motors, which has 44,000,000 shares outstanding, it was said.

Other steps sought by the Department of Justice and aimed at the break-up of the du Pont organization included sale by members of the du Pont family of all their holdings in U. S. Rubber. The family holdings are said to represent a 17% interest and are sufficient to give them control, since the remaining shares are held in small amounts by about 14,000 stockholders.

Also sought are sale by General Motors of its 50% stock interest in the Ethyl Corp., and sale by du Pont of its manufacturing interest in tetraethyl lead, ethyl fluid, and ethyl chloride; disposition by du Pont and General Motors of their holdings in the Kinetic Corp., manufacturer of refrigerants; and finally, cancellation of all existing contracts between General Motors, du Pont, and U. S. Rubber, dealing with the sales of products, grants of licenses, agreements to license under patents and for the exchange of production information.

The complaint listed five specific charges: (1) Du Pont requires that the three manufacturing defendants purchase substantially all their requirements for certain products from each other, thus freezing out other suppliers. (2) Du Pont has expanded its own facilities through acquisition of competing concerns and enlargement of existing plants and is thus able to produce in quantity, products in the chemical and related fields needed by the automobile and rubber companies. (3) General Motors and U. S. Rubber were "forced" by du Pont to expand their manufacture of automobiles, automobile and truck tires and tubes and to enter new fields of manufacture for the purpose of enlarging the "closed and guaranteed market" for sale of du Pont products. (4) Du Pont subsidized its own expansion by using profits from product sales to General Motors and U. S. Rubber, under "closed and non-competitive" market conditions. (5) Du Pont granted systematic rebates and preferential prices on its products sold to General Motors and sold the same products to other companies at higher prices. These practices enabled du Pont to "subsidize" the expansion of General Motors. Du Pont, the complaint also added, required U. S: Rubber to give price preference to General Motors on tires and tubes for equipping new cars and trucks and asked higher prices of other automobile manufacturers.

The Federal grand jury's investigation of the du Pont industrial group opened on November 17, 1948. In September, 1948, the Justice Department's Anti-Trust Division had announced that it was opening the investigation when it served subpoenas on five companies and issued subpoenas for the books and records of eight others. Later it was disclosed that 62 companies were included in the investigation.

Du Pont Co. Reply

Crawford H. Greenewalt, president of du Pont, on July 11, in a letter to company stockholders and customers, stated that he was writing in regard to the suit not only because of is great significance to the company, but because of what it implies for business in general and for the welfare of the country.

The central theme of the charges brought by the Department of Justice is that the individual defendants, through their stock ownerships in the various defendant corporations, have required these corporations to purchase goods from each other, thereby serving to restrain trade, Mr. Greenewalt's letter said.

"For the du Pont Co., we deny emphatically that our business transactions with these companies have been illegal or improper in any sense. While not attempting to speak for the one hundred or more individual defendants, we do affirm positively that no pressure has been exerted by these persons directly or indirectly on the du Pont Co.'s management to pursue the course of action alleged by the Government.

"It is impossible for me in the space of this letter to deal with the many specific charges brought by the Department of Justice," it was added. "They will be answered fully in court at the proper time. Many of them are of no substance, some are completely unfounded or grossly exaggerated, and even in the aggregate could not possibly justify the drastic remedies demanded.

"For example, it is alleged that the du Pont Co. 'subsidized' its expansion 'by using for such purpose the profits derived by it from sale of its products on a closed market basis to General Motors and U. S. Rubber, as well as the profits derived by du Pont Co. from its ownership of General Motors stock.'

"This charge has no basis in fact. Du Pont has paid out as dividends a higher percentage of net earnings than has been the case in most industries. Furthermore dividends from General Motors after taxes have traditionally been passed on intact to du Pont stockholders.

"As to du Pont sales, the dollar volume as stated by the Department of Justice for the ten-year period 1938 to 1947 totaled $134,000,000 to General Motors and $72,000,000 to U. S. Rubber. These represent 2.6 and 1.4% respectively of du Pont's total sales during the period to all customers, which amounted to $5,090,000,000. During the same ten years, du Pont's expenditures for new plant construction and equipment were $458,000,000. Can anyone seriously believe that profits from this small percentage of our total sales could support an expansion program of such magnitude?" it was asked.

"The parallel charge that 'rebates' on the $134,000,000 sales to General Motors made possible that company's expansion is also not supportable. Such allegations show either ignorance of the most elementary economics, or willingness to distort the significance of the facts.

"Again, the charge that du Pont forced General Motors and U. S. Rubber to expand in lines outside their normal business to provide outlets for du Pont products is simply absurd. If du Pont's only means of increasing sales had been by the enforced expansion of customers, it would indeed have remained small, insignificant, and presumably virtuous.

"The true purpose of this case was stated by U. S. Attorney General Tom C. Clark when he said that it was 'directed to the breaking up of the largest single concentration of industrial power in the United States.' From this statement, coupled with the nature of the specific charges, we can only conclude that this suit arise out of a determination by the Department of Justice to attack bigness in business as such.

"It is apparent that the Department of Justice is proceeding along this path with no real understanding of the nature of the American economy and with no realization of the consequences to that economy of a successful attack upon bigness in business.

"It must be clear to anyone that there are many jobs which can be best accomplished by small business, but that there are others that can be accomplished only by large companies with many resources at their disposal. It is *cooperation* between large and small enterprises that has contributed strength and vigor to our economy," the letter further said.

Mr. Greenewalt then went on to show how by virtue of the many resources of the du Pont company it had been possible to make this country independent of Germany in dyestuffs, to develop nylon, neoprene, plastics, cellophane, rayon, etc., all of which required tremendous sums of money and required a considerable number of years before there was any assurance that any of them would be successful or would ever return a profit.

It was added that during the recent war, du Pont, already burdened with the huge task of supplying unprecedented quantities of manufactured products for the Armed Services, was asked by the government to design, construct, and operate a plant to produce plutonium for the atomic warfare program. This request was accepted upon the insistence of the government that du Pont was uniquely qualified for that undertaking. A plant costing $350,000,000 and involving technical and industrial problems never before encountered was designed and built. It produced plutonium in time for its effective use, the du Pont president said.

It was also pointed out that if du Pont lost this suit and was required to sell its 10,000,000 shares of General Motors stock, this action would depress the market price of GM securities seriously and cause vast injury to several hundred thousand GM stockholders, as well as to the 100,000 du Pont stockholders.

"Furthermore, such sale and distribution would involve for your company and for its stockholders a very large tax liability. First there would be the capital gains tax on profits resulting from the sale of the stock. The subsequent distribution of the proceeds would then result in a large cash income taxable as such to stockholders in the year of distribution. Hence the remedy demanded by the Department of Justice is largely punitive and confiscatory, since it would result in channeling perhaps two-thirds of the sum realized from the sale of this asset away from du Pont stockholders and into the hands of the government."

In conclusion, Mr. Greenewalt said that while the dangers contained in this suit are extremely serious not alone for those directly interested—the stockholders and the employes of the companies involved, and many thousands of other Americans—the philosophy and way of thinking that lie behind it present an even greater danger.

"The ability of the United States to advance in peace and survive in war is threatened by this contention that bigness is bad in anything but goverment," he added.

U. S. Rubber Statement

Herbert E. Smith, chairman of the board, U. S. Rubber, issued the following statement on June 30 in answer to the Department of Justice suit.

"The United States Rubber Co. is a leader in one of the most highly competitive

industries in America. We are in business to serve the public by providing the best possible products at the lowest possible prices. All our relationships with other companies are designed to help us achieve this objective. We believe that a company, like an individual, prospers only to the extent that it serves, and that bigness in business is a reliable sign of service. We deny the government's charge that we are violating the anti-trust laws."

Commerce Rubber Division Meeting

The Rubber Division, Office of Domestic Commerce, U. S. Department of Commerce, at a meeting late in June with its Industry Advisory Committee decided on changes in Rubber Order R-1 to permit a greater free choice by manufacturers of rubber goods of the type of rubber they may use. It was recommended that the required use of synthetic rubber in tires above 7.50 (small truck tire size) be dispensed with. Heretofore tires below 11.00 down to and including 8.25 have had to be made with a minimum average of 3% general-purpose synthetic rubber, and these tires had a minimum individual tire requirement of 1%. It was also recommended that synthetic rubber specifications affecting bicycle tires be removed and that the use of synthetic tire flaps be eliminated.

The required use of Butyl rubber in the manufacture of inner tubes is also to be reduced by approximately 7,000 long tons a year.

The Department of Commerce stated that it has been its policy to reduce required use of synthetic rubber whenever basic national security interests permit. This policy considers fully the obligation of protecting the minimum synthetic rubber consumption provisions of the Rubber Act of 1948. As a result of the discussions with the Rubber Division Industry Advisory Committee, a revision of R-1 will be issued shortly, it was said.

World production of natural rubber in 1949 is now estimated by the Commerce Rubber Division at 1,535,000 long tons, 40,000 tons less than the total indicated last April by the International Rubber Study Group in London.

Expected United States consumption of natural rubber this year is now placed at 570,000 long tons, leaving 965,000 tons for consumption in the rest of the world and for inventory adjustments.

In addition, this country will probably consume 410,000 long tons of synthetic rubber of various types, or a total of 980,000 tons of new rubber, in 1949. This figure is 30,000 tons less than the total projected U. S. consumption announced earlier by the Rubber Study Group.

It is expected that manufacture of transportation items (tires, tubes, and camelback) will account for 682,000 tons of new rubber in the United States during 1949, and that 298,000 tons will go into other products.

Bus and Truck Tire Price Cuts

Following the cut in price of passenger-car tires and tubes announced last month, a similar cut of between 5% and 7½% in the price of bus and truck tires and tubes was made early in July by the Goodyear, U. S. Rubber, Firestone, Goodrich, General, Lee Rubber, and Seiberling Rubber companies. It is expected that other tire manufacturing companies will provide similar cuts in the price of their truck and bus tires and tubes if they are not at approximately the same level.

List prices on truck tires are not the selling price, as they usually are for passenger-car tires. They are merely the place from where dealers and manufacturers start figuring discounts, depending on the size of the order.

In general, these truck and bus tire and tube price changes did not include industrial tires and tubes, solid tires, and farm service tires and tubes.

Meanwhile, manufacturers' shipments of passenger-car tires during May totaled 5,908,606 units, an increase of 4.3% over April, when 5,666,650 tires were shipped, according to the monthly report of the Rubber Manufacturers Association, Inc., released on July 11.

Production of passenger-car tires increased during May to 5,980,837 units from 5,939,645 in the previous month; while inventories of 10,769,289 showed little change from those at the end of April.

Truck and bus tire shipments declined in May to 915,037 units from the 944,093 units shipped in April. Production was down 6.5% to 953,489 from 1,019,670 units in the previous month. Inventories increased 1.9% to 2,531,914 units, against 2,485,314 on April 30.

Shipments of automotive tubes declined about 1.9% in May to 5,296,063 units, against 5,396,411 for the month before. Production was up about 0.5% to 6,088,164 from 6,058,992 in April, and stocks increased 5.6% to 12,410,463 from 11,747,607 at the previous month's end.

Rubber Consumption Figures

New rubber consumption for June was estimated by the RMA on July 26 at 84,685 long tons, 4.2% over the 81,293 tons for May.

Natural rubber used during June totaled 47,688 long tons, an increase of 3.8% over May, when 45,928 tons were consumed. Tonnage of synthetic rubber used was also up, with 36,997 long tons consumed in June, against 35,365 tons for May, an increase of 4.6%. The breakdown of June synthetic rubber consumption by types showed: GR-S, 28,861 tons; neoprene, 2,634 tons; Butyl, 4,999 tons; and nitrile types 503 tons.

Production of synthetic rubber in the government plants for July was estimated in Lockwood's July 15 *Rubber Report* as: GR-S, 25,500 long tons and GR-I, 5,600 long tons.

Rubber in Roads

Lockwood's July 15 *Rubber Report* has the following comment on the use of rubber powder in road construction, which development received considerable impetus during the last few months.

"We can report that the program to use rubber powder in road construction is unfolding with amazing speed and widespread interest. Looking conservatively at this entire development we see an immediate market within the next six months for 1,000 tons of powder, and in the following year for a monthly market of 1,000 tons, with future volume mounting rapidly.

"In addition to the official State test roads recently laid in Virginia, Ohio, Minnesota, and Texas, considerable interest has been expressed by the authorities in California, Pennsylvania, and Quebec.

"The proven advantages rubber brings to asphalt in road construction certainly indicate that this new use prospect is the most significant in rubber since pneumatic tire," the Report concludes.

Synthetic Patent Pool Impasse

The *Report* has the following comment on the negotiations that have been going on for some time between the American and the Canadian governments in connection with the dissolution of the wartime patent pool on synthetic rubber. American industry and government has reached an agreement for the termination of this patent pooling agreement, but the Canadian Government has not been willing to agree to such action.

"From all that we can gather, the impasse in the patent pool negotiations with Canada could be settled by this government's agreement with Canada to continue the reciprocal patent exchange arrangement between the two governments, without including private industry in the agreement. Canada would apparently be satisfied with this arrangement, and we presume that American industry would be entirely agreeable as long as they were in no sense of the word parties to the agreement."

Labor News

From Akron on July 1, H. R. Lloyd, president of the United Rubber Workers, CIO, announced that the general executive board of that union would meet on July 7 to draft a plan to aid the unemployed in the rubber industry.

"Reports from our local unions throughout the country show that layoffs and short work weeks are steadily increasing," Mr. Lloyd said.

"Our big need today is to bolster purchasing power and make jobs available to the younger folks who are being laid off. The union program, providing for wage increases and adequate pensions, is a constructive step toward meeting that need."

Notice of cancellation of their contract with the Goodrich company as of August 25 has been given by the URW. A strike vote will be taken at the Akron Plant on August 4.

It was also reported that negotiations between the URWA and Firestone Tire & Rubber Co. would start in Cleveland, O., August 16; with U. S. Rubber in New York, N. Y., on August 8; and with the Goodyear Tire & Rubber Co., at a place still to be selected, on August 1. These negotiations are concerned with the union's request for a 25¢-an-hour wage increase and a $100-a-month pension plan for members of the union on their retirement.

On July 11 it was announced that the URWA general executive board had voted to collect from its members a one-million-dollar "economic defense fund" in connection with the union's wage increase demands. All union members will be urged to contribute $1 weekly and officers of the union $5 weekly.

The union also proposed a broad economic program to combat unemployment in the rubber industry by an extension of the six-hour day without reduction in take-home pay and called for federal legislation reducing the standard work week from 40 to 30 hours. The union cited U. S. Bureau of Labor statistics showing a drop in rubber industry employment from 199,000 in November, 1948, to 174,000 in May, 1949. A union survey, it added, showed a drop of more than 10% between January and mid-June of this year.

"But while jobs have been falling," the union executive board stated, "production has shown little or no change. In fact, more tires were produced last April than in April, 1948, despite the sharp drop in

employment. Consumption of rubber by the entire industry showed only a 6% decline in the first four months of this year as compared with the same period of 1948.

"In short," it was added, "while workers are being laid off, those still at work are being compelled, through various means, to increase output. This has been accomplished largely through rate-cutting with its accompanying speed-up."

On a national scale the URWA proposed, in addition to a 30-hour week, the start of an emergency public works program and a $1-an-hour minimum wage.

In Chicago the strike at the Dryden Division, Sheller Mfg. Co., was ended after 44 days, and the 1,000 URWA workers returned to work on July 8 after voting to accept the company's terms which, although they did not include a wage increase, will make it possible for workers to earn an additional 2% in incentive rates for extra production.

A work stoppage of about a week in mid-July almost shut down the Akron plant of the Goodrich Company. A walkout of shipping room employes resulted from the dismissal of one of their number by the company in order to reduce the staff of that department. The company and the union will arrange meetings to settle this grievance.

RMA Conference on the Havana ITO Charter

The Rubber Manufacturers Association, Inc., as announced in our July issue, held a conference study of the Havana Charter for the International Trade Organization at the Hotel Roosevelt in New York, N. Y., on June 28. Attended by about 100 members of the Association and other interested parties, this conference, which consisted of morning, afternoon, and evening sessions, lived up to expectations in being the largest and most important public meeting the rubber goods manufacturing industry has held in more than a decade.

The forum was presented as a debate with the opponents of the Charter, Philip Cortney, president of Coty, Inc., and Coty International Corp., Elvin H. Killheffer, until recently an executive of E. I. du Pont de Nemours & Co., Inc., and Michael A. Heilperin, economic adviser of Bristol-Myers Co., presenting arguments during the morning session.

After luncheon the proponents, William L. Batt, president of SKF Industries, Inc., Clair Wilcox, professor of economics at Swarthmore College, Morris S. Rosenthal, president of Stein, Hall & Co., and Winthrop G. Brown, director of the Office of International Trade Policy for the United States Department of State, presented their case.

Following the afternoon meeting a reception was held prior to the concluding dinner for final summation and answers to significant questions developed during the prior sessions.

Howard S. Piquet, senior specialist in International Economics of the Legislative Reference Service, Library of Congress, acted as moderator and presented the final summation at dinner; he also presided over the question-and-answer period which followed.

The Morning Session

A. L. Viles, president of the RMA, opened the first session by welcoming those in attendance at the conference and then explained the reason for the Association undertaking a conference on the ITO Havana Charter. He pointed out that the rubber industry for many years has been dealing with various forms of control, particularly in connection with one of our principal raw materials, crude natural rubber. These controls were either sponsored by government or operated by government under treaty. Therefore working with these controls, and struggling with the effect of such controls, the industry was quite naturally led into a position of wondering what an international trade organization might mean in the conduct of its business, since one of the most important and strategic businesses in the entire industrial world is the rubber business, he added.

Mr. Viles then introduced the speakers for the conference and turned the meeting over to Mr. Piquet as moderator.

Mr. Piquet, in his opening remarks, congratulated James Tanham, vice president of the Texas Co., on his booklet, "The Havana Charter—Good or Bad?", which was available at the conference. He next quoted William L. Clayton, former adviser to the Secretary of State and one of the leading negotiators and supporters of the Charter, who said:

"If the United States should fail to ratify the Charter, that action would not only be contrary to our best interests, but would be a shock to the whole world."

Mr. Piquet also quoted Dr. Killheffer, who was a member of the United States delegation to the Havana Conference, as follows:

"The Charter is a master plan for the conduct of international trade by governments or, worse still, a supergovernment, an international bureaucracy."

It was pointed out that both positions could not be correct, although they both might be incorrect. Two other points of view were also mentioned: (1) that the Charter is just window dressing and has no important value to world trade; (2) that the Charter does not give other countries license to do anything they would not do anyway without the Charter.

Mr. Piquet emphasized that there was a question that went deeper than any of the above and urged the speakers to address themselves particularly to this point which was:

"Do we, by adhering to the Charter, weaken our bargaining position with regard to economic foreign policy?"

The Charter is now before Congress, Mr. Piquet explained, sent by President Truman in the form of an Executive Agreement, not as a treaty. Congress is not likely to consider the ITO Charter in this session, and there are several months before a decision will be reached during which time American citizens have the obligation to inform themselves as to what it is all about.

The speakers were cautioned that the debate was not on the subject of "free trade," but on the internal logic of the Charter as drafted at Havana.

The theme of argument given by Messrs. Cortney, Killheffer and Heilperin was that the United States will gain prestige throughout the world if it forthrightly rejects the Havana Charter for the ITO. These speakers also refuted the basic argument that if this country rejects the Havana Charter, there is no alternative but chaos in world trade, which the supporters of the Charter maintained now exists.

The three speakers opposing the ITO asserted that the Havana Charter does not guarantee reduction of trade restrictions and in fact sanctions and legalizes their indefinite continuance, thus losing for this country the power to protect our interest in situations where other nations persist in discriminating against us.

All three speakers supported international cooperation for the expansion of world trade, but stated there is no meeting of minds among the nations in the Havana Charter. If world trade is to be expanded through the activities of an international organization, then we should strive for a real agreement on basic issues. We should not compromise the fundamental principles of our free enterprise system with the ideological experiments of state socialism, it was added.

It was also said that if there were a will to negotiate, at an appropriate time, a Charter consistent with our historical principles, our country would then truly become the economic leader of the world for peace and prosperity.

In his discussion, Mr. Heilperin stated that the Havana Charter establishes an international trading system which is almost the exact opposite to that which the United States set out to establish when launching the ITO project in 1945. The Charter gives to state socialism the right of way over free enterprise capitalism. It makes economic nationalism the accepted pattern of national policy. This is due undoubtedly to the fact that socialist and nationalist nations had the preponderant majority at the Havana Conference.

Mr. Heilperin, whose criticisms of the Charter centered principally on the foreign investment aspects of the proposed ITO, added:

"The London *Economist* has been conducting for several years a campaign to persuade the United States to accept the discrimination that has been practiced against it in world markets. So far, nondiscrimination has been one of the basic tenets of our foreign policy. But should we join the ITO, we should be compelled to accept discrimination in line with the *Economist's* wishes."

With regard to foreign investments, even though the Charter recognizes the need of protecting the rights of private capital which ventures into foreign lands, Article 12 is the sheerest parody of such protection, this speaker said. Under that Article, governments of capital-importing countries retain the right to expropriate foreign investments, wholly or partly, and to engage in a variety of arbitrary measures affecting foreign investments.

The Afternoon Session

All four speakers in support of the ITO Havana Charter united in stressing points that the Charter, which was negotiated by 56 nations after four years of consideration, represents one of the most significant documents in the history of international negotiations, constitutes a flexible and democratic basis for working toward a solution of the critical economic conditions affecting the free nations of the world, and presents an effective and constructive answer to the destructive and disruptive policies of Russian Communism. These speakers also were unanimous in asserting that failure by the United States to approve the

Charter and its International Trade Organization would seriously impair America's world leadership, and they challenged the opposition to bring forward a workable substitute.

"The Havana Charter is the only existing instrument designed to restore private competitive trade on an international scale," Mr. Rosenthal said. "We have heard a lot of criticism, but no one has come forward with a realistic, practical alternative. The ITO will provide both long-term and immediate benefits to American business. By easing trade barriers, it will help to sustain the foreign markets for American goods when we stop pumping in dollar exchange through the European Recovery Program.

Emphasizing that the ITO reflects American leadership in early planning for postwar recovery, Professor Wilcox said: "The ITO as contained in the Havana Charter is American in conception and is firmly rooted in American principles. It establishes democratic procedures of consultation within the United Nations as the method for dealing with trade conflicts. It will take its place beside the FAO, the ILO, the World Bank and the Monetary Fund among the specialized agencies of the United Nations."

"The Charter is necessarily a product of compromise. Many countries have serious objections to certain provisions, but have expressed willingness to participate in the ITO because of the over-all gains to their trade and the world-wide flow of goods and services. Adjustments can and will be made as required by experience and practice. The Charter provides ample flexibility for any necessary operational and procedural changes. The effectiveness of the ITO will depend largely upon the actions of the member countries in resolving their day-to-day problems. The interests of U. S. investors, traders, producers and consumers will best be served if we are at hand to help shape the policy of the ITO."

Stressing the importance in the "cold war" with Russian Communism of restoring the world's economy, Mr. Batt said: "We are here today to talk primarily about the ITO. But we are actually talking about a great deal more than that. In these modern times, economic problems and political problems are inseparable. That which determines the shape of world trade in the days to come will also inevitably determine the political shape of the world."

Mr. Batt described the ITO as a third, and equally important pillar in America's foreign policy along with the Marshall Plan and the Atlantic Pact. To expand foreign trade is just as essential as to restore European production; without it, European goods will have only restricted markets to flow to, and much of the benefit of the ERP will be lost. If Western Europe sinks into an economic depression as a result, it is problematical if the Atlantic Pact can give them adequate security. Only by attacking the critical problems of world trade can the ERP and the Atlantic Pact have their full meaning. Only by building peace on a firm economic foundation can we have any safety, he added.

Mr. Brown cited three possible courses to restore world trade. One would be to do nothing and assume that "the world will muddle through somehow without our help." A second course might be to "try to turn the clock backwards — and to re-establish immediately and in their full and complete form the liberal trading practices of the nineteenth century —. The practical political and economic fact is that no country — not even our own — would accept such a course today."

Continuing, he said: "The third approach, is to attempt, through concerted action among many countries to deal with world trade problems as they exist now. This is the approach of the Havana Charter, the Reciprocal Trade Agreements Program and the European Recovery Program. It is the only approach that promises a realistic attack on present trade problems."

Mr. Brown listed three basic principles as underlying the Charter. The first is "concerted action" to replace unilateral action that promotes economic strife and shrinks world trade. The second is creation of "a practical instrument to cope with world trade problems that face us now." The third is provision of the "the kind of world trading pattern that would give maximum scope to *competitive international trade*, thus benefiting our own free enterprise system."

The Evening Session

At the evening session, Mr. Piquet first presented an excellent summation of the arguments of both sides, followed by some further comments of his own. Space does not permit including this summation in this report, but it will be a part of the printed report of the conference that the RMA will prepare and distribute to all persons who attended the conference and all those in the rubber manufacturing industry.

Mr. Piquet's own comments following the summation were, if, as it has been said, the ITO can be nothing more than consultative and recommendatory and advisory, why must it be so complicated?

Also if you have a flexible instrument that could change as its environment changed and depended upon interpretation of its working by the courts, as with the Clayton Act of 1914, why wouldn't that be more satisfactory than trying to define all the details beforehand? Maybe we are trying to run before we can walk, in trying to spell out all of the details.

Do we weaken or do we strengthen ourselves in terms of international economic influence by ratifying the charter. Because of our type of government we are not equipped to act with the same speed as those countries having a parliamentary form of government. We ought to be careful to see that we are permitted to act with enlightened self-interest, and that we do not shackle ourselves by an agreement to which we shall nevertheless feel compelled, by instinct and training to adhere to and live up to, Mr. Piquet concluded.

Some 14 questions, each of which contained several parts, were answered by the speakers at the dinner session. These questions were concerned with industry representation if the ITO Charter was signed by Congress, how a commodity agreement could be written so as not to limit technological development, why the United States doesn't make a real attempt to correct world trade problems and promote development of underdeveloped areas by insisting on currency convertibility and protection of foreign investment in exchange for our ECA trade instead of embarking upon this questionable ITO program, to mention two or three.

Before adjournment there was a final short further summation by Dr. Killheffer who called attention to the wide divergence in opinions and philosophies of the 50 or 60 member nations of the ITO and asked how decisions of its council might be expected. These problems will not then lead to amity and peace, but in another direction entirely. We should therefore start afresh, Dr. Killheffer concluded.

Mr. Rosenthal in his summation stated that we must have the courage to foster an agency of the United Nations that will deal with goods and services, recognizing the differences of opinion present among the various participants, recognizing all the difficulties, accepting the challenge thus presented, and offering our leadership to an economic group formed among the nations of the world in an effort further to spread freedom and to make democracy live abroad, as it lives here.

Mr. Piquet congratulated the RMA on its performance of a distinct public service in holding the conference on the ITO Charter, and Mr. Viles in adjourning the meeting thanked the speakers and all those who participated for contribution and help. He expressed particular appreciation to W. James Sears, RMA executive vice president, and Charles Miller, of the RMA Washington office, for their part in organizing and handling all the numerous details of the conference.

Stockholders Reports Awards

From the 4,200 corporation annual reports for 1948 submitted in the ninth annual survey conducted by Weston Smith of *Financial World*, 86 Trinity Pl., New York 6, N. Y., 12 manufacturing companies in the rubber industry have qualified for "Highest Merit Award" citations. These companies are: American Hard Rubber Co.; Armstrong Rubber Co.; Dayton Rubber Co.; Dunlop Rubber, Ltd.; Firestone Tire & Rubber Co.; General Tire & Rubber Co.; B. F. Goodrich Co.; Goodyear Tire & Rubber Co.; Hewitt-Robins, Inc.; Norwalk Tire & Rubber Co.; Seiberling Rubber Co.; and Thermoid Co.

The stockholder reports of these companies have thus become candidates for the final judging, and one will be selected for a "Best of Industry" award and presented with a bronze "Oscar of Industry" at the *World's* annual report awards banquet on October 31 at the Hotel Statler, New York, N. Y. The 1948 "Oscar" was won by Dayton Rubber. The board of judges in this year's competition is under the chairmanship of Lewis H. Haney, New York University.

Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa., has signed a contract with the Army Ordnance Department to organize and operate a laboratory for basic research and development in rockets and jet propulsion. According to Otto Haas, company president, the project will be located at the Redstone Arsenal, near Huntsville, Ala.

"The company is undertaking this project as a public service," said Mr. Haas. "We have no intention of entering into the manufacture of propellants."

The company was asked to enter into this contract because it has a number of men whose wartime experience fits them to assume key positions in the technical organization required for this project. Foremost in this group is Ralph Connor, vice president in charge of research, who during the war served as sectional chief and later chief of division 8 of the National Defense Research Committee attached to the Office of Scientific Research and Development.

EAST

Changes at American Cyanamid

American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., last month announced several changes among its personnel.

Vincent V. Lindgren and B. R. Putnam, Jr., are now with the new product development department. Dr. Lindgren, with the company for the past three years in its Stamford, Conn., research laboratories, will devote his time to new product development activities; while Mr. Putnam, who has been engaged in engineering development in the company's technical department, will be concerned with market research activities.

Gerald Johnson, G. Sidney Sprague, and Louis Quin recently joined the research staff of the Stamford laboratories. Dr. Johnson has his Ph.D. from the University of Texas. Dr. Sprague's doctorate was received from New York University, and Mr. Quin has just earned his master's degree at the University of North Carolina.

Elwood Murray, formerly with Richard-Coulston Co., Samuel Crecelius, previously with S. C. Johnson & Son, and John F. Davis, who recently completed his M.S. at Stevens Institute of Technology, have entered the surface coating group of the research laboratories in Stamford.

American Cyanamid has also announced the renewal of 15 scholarships for the academic year 1949-50, chiefly in the fields of chemistry and chemical engineering Generally these scholarships provide $1,500, and are awarded to graduate students in their last year of pre-doctoral study. Recipients of post-doctoral scholarships receive $3,000. Scholarships have been established at Brown University, Massachusetts Institute of Technology, Columbia University, Princeton University, University of Virginia, Pennsylvania State College, Cornell University, University of Illinois, University of Notre Dame, University of Michigan, University of Wisconsin, University of Minnesota, University of Colorado, and Purdue University.

Promotions at du Pont

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has named Robert L. Richards general manager of its rayon department, to succeed Benjamin M. May, who retired June 30 after more than 46 years with the company. Mr. Richards, who started with du Pont as an operator at the Buffalo plant in 1923 and won many promotions thereafter, had been assistant manager of the rayon department since January 1, 1947.

George S. Demme, assistant director of nylon sales for the last five years, has been made director of sales of the acetate division of the rayon department. He succeeds Robert E. Cullen, who has retired after more than 34 years with du Pont. Mr. Demme has been with the company since 1918, serving in various capacities including chemist, assistant to the head of plant control, supervisor of plant operations, then of rayon operations, as head of viscose process rayon sales service in the southern territory, chief clerk for viscose process rayon sales, salesman in the New York district, Philadelphia district sales manager, and district sales manager in New York.

Max A. Minnig

Witco Chemical Co., 295 Madison Ave., New York 17, N. Y., has appointed Armstrong Industrial Supply Co., Trenton, N. J., representative of Witco Chemical, Continental Carbon Co., and Witco Hydrocarbon Co. as agent of carbon black sales for Witco Chemical. The Trenton concern, of which C. W. Armstrong is president, will have supervision of all carbon black sales in Mercer County and Trenton, N. J.

Max A. Minnig has been named sales manager of the carbon black division, with his headquarters at 311 Evans Bldg., Akron, O. Mr. Minnig will also continue his connection with Witco Carbon Co. as vice president and director.

Continental Carbon Co., 295 Madison Ave., New York 17, N. Y., recently completed the transfer of several carbon black producing units from Sunray, Tex., to Eunice, N. M. In their new location the units will produce an additional 1,200,000 pounds of channel black a month. This type of black constitutes more than half of the total amount used by the rubber industry, and this increased production will assist in assuring adequate supplies of channel black.

Snell Receives SCI Medal

The gold medal of the Society of Chemical Industry was awarded to Foster D. Snell, president of Foster D. Snell, Inc., New York, N. Y., at a meeting of the Society in Manchester, England, on July 13. Awarded biennially to a person "who has attained eminence in applied chemistry," Dr. Snell was the second American thus to be honored in the 53-year history of the medal.

In accepting the medal, Dr. Snell said that science is and must remain a strong unifying force among peoples. Scientists around the world have always been leaders in international friendship and have always been willing and eager to promote the exchange of information internationally. Dr. Snell's medal address, following this introduction, dealt with "Detergents and Detergency," describing the relations between the chemical and physical properties of synthetic and natural detergents and their effectiveness as cleaning and washing agents in both household and industrial applications.

Consolidating Tire and Tube Operations

Consolidation of the tire and tube manufacturing facilities of the Pennsylvania Rubber Co., Jeannette, Pa., with those of the Mansfield Tire & Rubber Co., Mansfield, O., was announced last month by H. B. Soulen, president of the Mansfield company, and Gordon H. Groth, vice-president and general manager of the Pennsylvania company.

The consolidation, effective July 1, follows several months of negotiations and will bring Pennsylvania's tire and tube production to the Mansfield plant.

The announcement said: "The combined production of the two plants will give both Mansfield and Pennsylvania customers and dealers a greatly strengthened source of supply. Sales policies for distribution of both the Mansfield brands and the Pennsylvania brands will remain unchanged."

Pennsylvania Rubber, organized some 50 years ago, will continue to manufacture its nationally known line of athletic goods at Jeannette, and it has plans under consideration for manufacturing additional products there.

Free Advisory Service

Glenn L. Martin Co., Baltimore 3, Md., in an article in the July issue of its house organ, *Martin Star*, explains why more and more vinyl resin compounders and processors are taking advantage of the company's free technical advisory service. The chemical division's technical service facilities are devoted exclusively to the solution of the immediate problems of customers. Technical service projects begin with presentation of the field problem in the form of a salesman's request for research work in behalf of a client. This request is reviewed by the director of sales and technical service, who rates the job on urgency of performance. The director of development then assigns the job to laboratory technicians, and an operations control board follows the progress of all projects. Finally, the case history of each project, in the form of laboratory reports, is reviewed, and recommendations are drawn up for submission to the client.

Martin Now Chairman of the Board

Glenn L. Martin, leader in the aircraft industry and head of his own company during 40 years of aviation's 46-year history, on July 15 became chairman of the board, a newly created position, of The Glenn L. Martin Co. At the same time Mr. Martin announced that C. C. Pearson, a veteran of 19½ years' experience as an aircraft executive, has succeeded him as president and general manager of the company.

The board of directors, in its regular monthly meeting at Baltimore, on July 15 also accepted the resignations of Harry T. Rowland as executive vice president and a director and of Morgan R. Schermerhorn, Jr., as vice president-controller and a director. Mr. Pearson was elected a director.

Daniel A. Evatt, treasurer since February 20, 1948, was named vice president-finance; W. L. Lucas was advanced from assistant treasurer to treasurer; and Earl R. Uhlig, from assistant controller to controller. Franklin M. Beall, became assistant controller, and Robert A. Schmidt, assistant secretary.

General Offers Mining Tire

General Tire & Rubber Co., Akron, is now making the Mining Special tire, said to be rugged enough for the toughest mine assignment anywhere. According to Karl A. Dalsky, manager of truck tire sales, new trackless mining equipment rolling on the Mining Special tire offers mine operators all the advantages of rail handling plus greater speed and mobility on the job. The new tire is designed with an extremely wide tread for greater flotation, and extra-thick reinforced shoulders for mine duty. The smooth sidewall resists cuts, snags, and bruises, and gripping action is assured by extra-deep cleated, self-cleaning tread "did-ins." The new tire is available in sizes 7.50-15, both 10- and 12-ply; 8.25-15, both 12- and 14-ply; and 10.00-15, 14-ply.

Greater Non-Skid Claimed for Jet C.M. Tread

Vice President L. A. McQueen has announced that claims of greater non-skid on wet pavement for General's new tire tread rubber, Jet C.M., over natural tire tread rubber have been confirmed.

"Six months ago," Mr. McQueen pointed out, "we announced our new Jet C.M. rubber with the claim that it not only would give from 1 to 25% greater mileage, but also that it would afford motorists greater safety through road traction. The mileage and traction records compiled since this new rubber was introduced have come up to and even beyond expectations.

"The amazing new carbon black masterbatch—something every rubber company has been trying to achieve for the past 40 years—was developed during the war years by General's chemists, and this formula was the first step in the Jet C.M. development," Mr. McQueen added. "No natural rubber records can compare with the performance of this Jet C.M."

Because of the limited production of Jet C.M. rubber, it is used only in the company's Squeegee passenger line.

Columbia Chemical Division, Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh 22, Pa., has placed in operation a new chlorinated benzene producing plant at Natrium, W. Va., it was announced by E. T. Asplundh, vice president in charge of chemical operations. Under construction for more than a year, the estimated cost of the new plant is more than $1,000,000. The plant will produce monochlorbenzene, muriatic acid, paradichlorbenzene, and orthodichlorbenzene as co-products in a continuous chemical process. Production of the chlorinated benzenes, basic chemicals in the organic field, marks the Division's entry into the field of organic chemical compounds production.

Weston Electrical Instrument Corp., Newark, N. J., and its subsidiary, C. J. Tagliabue Corp. (N.J.), have established a district sales office at 6230 Third St., N. W., Washington, D. C., with Lawrence F. Parachini as district manager. This new office will serve the District of Columbia and adjacent counties. Mr. Parachini joined Weston in 1928, working first on inspection and calibration of instruments, and later as a commercial design engineer. He then served as the company's educational division director and manager of educational and public utility sales.

Pach Bros.

W. E. Cake

U. S. Rubber Advances Cake

Appointment of W. E. Cake as managing director, plantation division, United States Rubber Co., Rockefeller Center, New York 20, N. Y., was announced July 15 by H. E. Humphreys, Jr., president.

Mr. Cake, formerly assistant managing director of the division, succeeds J. W. Bicknell, who for reasons of health has asked to be relieved of active management of the division. Mr. Bicknell, however, will continue in a consulting capacity. He has been associated with the company's plantation operations for 39 years.

A native of Lake Linden, Mich., Mr. Cake joined U. S. Rubber in 1922 as a chemist, after receiving degrees from the University of Michigan. He went immediately to the company's rubber plantations in the Far East. Except for periodic leaves of absence, he spent 23 years in Malaya and Sumatra. He pioneered in chemical research on the rubber estates and became director of the plantation research department in 1930. During World War II, Mr. Cake was taken prisoner by the Japanese and was interned for three years on Sumatra. Soon after his return to this country in 1945, he was appointed assistant managing director of the plantation division of U. S. Rubber.

Transfer of Tires Division Personnel

John C. Richardson has been appointed manager of industrial tire sales for U. S. Tires division. Mr. Richardson joined U. S. Rubber in 1940 as a field service representative in Detroit, was named to handle aircraft tire and fuel cell service in 1942, and in 1944 became an instructor and eventually, chief instructor, at the company's recapping and repair school at Detroit. He was transferred to Chicago in 1945 where he specialized in service merchandising work, prior to his current appointment.

H. N. Nafstad has been appointed Minneapolis district manager for U. S. Tires, replacing the late C. K. McNay. Mr. Nafstad joined the rubber company in 1946 as a salesman in Minneapolis and later became assistant district manager there.

L. E. Gerretson has succeeded Mr. Nafstad in the latter capacity. Mr. Gerretson came to U. S. Rubber in 1948 as a sales representative in the central division at Chicago.

Enters Foam Sponge Field

Dayton Rubber Co., Dayton, O., has announced its entrance into the rapidly growing foam sponge field with the introduction of its Koolfoam pillow. According to the company, the pillow is manufactured under a patented process that develops an increased and more uniform number of interconnecting air cells. This, in turn, provides an improved ventilating action in the pillow as well as maximum softness, resilience, and tear resistance. Marketed through leading department stores throughout the country, the Koolfoam pillows measure 16 by 24 by 5½ inches and are offered in white and pastel shades of blue and pink. They are covered with a matching percale having a full 18-inch zipper for easy removal and washing. Each pillow is individually packaged with washing instructions enclosed. Counter and window cards, sales circulars, and newspaper mats are provided as sales stimulants for department stores.

Dayton Executive Reports on Europe

Ralph M. Reel, technical service manager of Dayton Rubber Export Co., on his return recently from Europe reported that economic conditions in that part of the world have improved considerably as compared with last year, when Mr. Reel was also in that area.

Marshall Plan aid plus the efforts of the peoples themselves in Denmark, Holland, France, Switzerland, and Norway has brought marked improvement in business conditions. In Scandinavian countries in particular the situation with regard to food and clothing is much better, and housing has also improved. There is plenty of food in France, but prices are high. The French workingman has to spend 75% of his income for food. The housing situation is still bad. Conditions in Switzerland were reported as good.

In Spain bad weather, including several years of drought, has cut down the production of electric power and food, and conditions in this country were described as not good.

Mr. Reel spent three months in Europe in order to contact and provide service to various European companies to whom Dayton rubber renders technical assistance. Robert Captstick, of Dayton, who was in Europe with Mr. Reel to handle special jobs in connection with technical assistance and service, is still in Denmark and will visit Holland before he returns to the United States.

B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15, O., has announced that its Geon polyvinyl plastic extrusion compound is used in Tub-Kove sealing strip, made by Keller Products, Inc., that seals and covers cracks at junctions of wall and bathtub, washbowl, stall showers, etc., preventing steam or water from entering and damaging the walls and woodwork. The sealing strip is white, highly flexible, will not craze or crack, and is unaffected by water. It will not harden, is resistant to normal alkali solutions, acids, and alcohols, and is unaffected by common household cleaning solutions, soaps, and detergents, it is further claimed. Supplied with a vinyl adhesive, the strip is readily adhered to porcelain, wood, clay-tile, plastic-tile, lino-wall, Con-go-wall, or any other types of surface materials used in bathrooms.

Davol Diamond Jubilee

Davol Rubber Co., Providence 2, R. I., celebrated its seventy-fifth anniversary at a dinner of the company's Quarter Century Club. The dinner, held on June 28 at the Narragansett Hotel, also commemorated the thirtieth anniversary of the Club.

Established in 1874 by Joseph Davol, the company was incorporated in 1882 as the Davol Mfg. Co. and took its present name in 1885. Specializing in "fine rubber goods" of the medical type, Davol has always stressed quality and now occupies an enviable position in the field of medical rubber goods. Davol President Ernest I. Kilcup is as proud of the human side of his company as he is of its manufacturing skill. The company has always enjoyed harmonious management-employe relations and has had industrial peace through its entire history. Davol was the first plant of its size in the country to adopt the five-day week, one of the first to adopt group life insurance for all employes, and one of the earliest in Rhode Island to establish Blue Cross group hospitalization, in addition to other measures planned to insure high morale among workers.

In 1918, Mr. Kilcup brought together the senior employes of the company and formed the Quarter Century Club. Today the Club has 124 members, of whom 96 are still in active service with an average of 33 years of employment. Of the active members, two have been with Davol 50 years or longer, 18, 40 years or more and 35 have served 30 or more years.

The quality of the company's products and labor relations was also the subject of congratulatory letters received from John O. Pastore, Governor of Rhode Island, and A. L. Viles, president of The Rubber Manufacturers Association, Inc., on the occasion of the anniversary dinner.

Enjay Opens New Office

Changes of sales personnel and offices to improve service to customers have been announced by I. E. Lightbown, manager of rubbers and plastics sales, Enjay Co., Inc., 15 W. 51st St., New York 19, N. Y.

E. N. Cunningham, who has been supervising the sale of Paracril Buna N-type rubber, has been placed in charge of the metropolitan territory for all rubbers and plastics, including Paracril, Vistanex polyisobutylene, S-Polymer thermoplastic resin, and Deenax antioxidant. He replaces R. M. Howlett, who moves to the Midwest territory with headquarters in Chicago.

An Enjay rubbers and plastics sales office has been opened at Room 706, Albender Bldg., 1143 E. Jersey St., Elizabeth 4, N. J., where Mr. Cunningham will make his headquarters, as will H. C. Evans, who is in charge of the eastern territory.

Taylor Instrument Cos., Rochester 1, N. Y., in the Summer, 1949, issue of its house organ, *Taylor Technology*, has an article on "Instrumentation Responsible for Higher Production and Quality in the Manufacture of Firestone Velon," by B. K. Lyckberg, resin plant manager, Firestone Plastics Co. This article describes the use of Taylor automatic controllers in maintaining optimum conditions during the critical polymerization phase in the production of vinyl chloride resin at Firestone's Pottstown, Pa., plant.

Promotions at Seiberling

New assignments for several Seiberling Rubber Co. sales department managers and the creation of a new passenger tire department were announced last month by L. M. Seiberling, vice president in charge of sales.

J. R. Lotze, formerly merchandising manager, is now manager of the newly created automobile tire and Sealed-Air tube department, in charge of sales of passenger tires and premium puncture-sealing tubes.

C. J. Marx, vice president and central division manager for Frankfort Distillers Corp., and a former Seiberling district manager, returns to the company as a special representative for the sales department.

O. K. Feikert, manager of accessories and repair materials sales, has also been assigned to supervise the company's service department. C. H. Etter, service manager, becomes a special field representative on service and adjustment problems.

J. F. Seiberling, in the company's government sales department during the war, returns as special government sales representative. He had been in charge of dealer relations, which post now goes to Paul C. McPherson, who continues also in charge of market research and sales personnel training.

J. A. Fouché, manager of the diversified products sales department, transfers to the advertising and merchandising department as assistant director. His assistant, P. R. Kemp, becomes department manager.

Ray G. Eckroad, a salesman and budget supervisor for the company, was named manager of Seiberling's budget sales department.

Clubrooms for Retired Employes

Because industrial relations seldom extend to those retired from active employment, considerable attention has been focused on facilities created for the newly formed "Farrel-Birmingham Retired Employees Club."

Area for two spacious rooms was provided when Farrel-Birmingham Co., Inc., Ansonia, Conn., converted a former pattern shop building into quarters now largely used for offices. The clubroom appointments, comparable to those of the finest social clubs, include well supplied book shelves and table-game paraphernalia.

At a dedicatory luncheon, well attended by those eligible for membership in the new organization, Franklin Farrel, Jr., director of the company and former chairman of the board, presented membership cards and denoted his satisfaction in "fulfilling a plan we have long had in mind."

Department of the Army, Washington, D. C., recently awarded the following contracts: Armstrong Rubber Co., West Haven, Conn., for 882,000 pounds of camelback at a cost of $169,623; Phillips Chemical Co., Bartlesville, Okla., 20,000 tons of ammonium sulfate, $592,100; The Plastic Wire & Cable Co., Jewett City, Conn., 42,000 miles of wire, $2,485,260; General Cable Corp., Philadelphia, Pa., 92,300 feet of cable, $256,620; Speed Products Co., Inc., 37-18 Northern Blvd., Long Island City, N. Y., 4,372 ¼-pound boxes of rubber bands and 4,299 one-pound boxes.

Changes at Goodrich

As a result of the retirement July 31 of Frank E. Titus, manager of the Pacific Coast division of the replacement tire sales division of The B. F. Goodrich Co., Akron, O., several changes in the division's staff organization have been made.

Lawrence T. Greiner has succeeded Mr. Titus, who directed the company's replacement sales in the 11 western states since 1928. Mr. Greiner, with the company 20 years, had been manager of the southwestern division of replacement sales for the last 30 months, with headquarters in Kansas City. He has been succeeded in that capacity by Conrad R. Helms, manager of the Charlotte, N. C., sales district.

That post goes to Frank C. Haralson, regional store manager of the southeastern division with headquarters in Atlanta, Ga. Donald C. Lacy, store manager in the Atlanta district, has been named to Mr. Haralson's former position.

Mr. Titus served Goodrich continuously for the last 42 years. Starting in the engineering division, he transferred to sales only a short time later and from 1910 to 1920 was manager of several sales districts in the eastern section of the country. In charge of foreign sales as vice president of International B. F. Goodrich Corp. from 1920 to 1925, Mr. Titus traveled extensively in 16 foreign countries setting up sales outlets and then became manager of the eastern sales division with headquarters in New York, N. Y., until he moved to the Pacific Coast three years later.

William H. Bowdle has been appointed credit and operations manager of N. V. Nederlandse B. F. Goodrich Compagnie, The Hague, Holland, a subsidiary selling company of International B. F. Goodrich Co. Mr. Bowdle, a field auditor for the last 10 years in the domestic parent company, succeeds W. A. Beck, named sales manager of the Holland company.

New Highway Tire

The Super Highway, a new tire built especially for high-speed, long-distance service in over-the-highway hauling, has been announced by Goodrich. Road tested by many haulers and bus lines, the new tire is said to give additional miles and more recaps at a lower cost per mile. The tire is made in sizes from 8.25-20 10-ply rating through 11.00-24 12-ply rating and operates under standard load and inflation schedules for the various sizes. The tire has a flatter design permitting greater road contact; the non-skid depth of the tread averages 13.5% deeper than standard tires, and the crown thickness 21% more. Made with rayon cord and Goodrich's exclusive nylon shock shield, the tire has weftless, full floating, even tension-type cords which help reduce tire growth and provide added bruise resistance. Other advantages claimed for the tire are even wear on either free-rolling or power wheels; extra tread grooves to help dissipate heat and distribute flexing; and special dual-tread construction to assure cool running with top mileage performance.

Rubber Diaphragms for Trains

The world's most modern streamlined railroad train, made by American Car & Foundry Co., is zippered together by ingenious rubber diaphragms housing pressure-sealing zipper fasteners made by Goodrich. Named the American Talgo, the train is to be tested and demonstrated across the nation. Each train coach has

only one pair of wheels in the rear. The rubber members, made of sheet and sponge rubber, form the outer wall of the revolutionary articulated train at points where the cars are coupled, resulting in a smooth outer surface throughout the length of the train. The zipper fasteners, developed by Goodrich during the war, enable rapid coupling and uncoupling of the cars and prevent the entrance of dust and moisture. In addition to the outer diaphragms at the car junctions, a second diaphragm is employed to form the inner wall where the cars join. The new train is air conditioned, and flexible rubber ducts are used in the system to connect all cars.

Electrically Heated Rubber of Wire Resister Type

Extension of the use of electrically heated rubber of the wire resister type to industrial applications has been announced by Goodrich. The material is constructed of resistance wires insulated with fabric plies sandwiched between layers of rubber sheeting, with the parallel wires running the length of the rubber. The latter can be furnished in any reasonable size, shape, or weight, and for temperatures up to 300° F. Operation is generally controlled by a thermostat. Heat, weather, and oil resistant synthetic rubber is used, and the finished product can be applied either by adhesion or placed on a metal background for bolting into permanent position. Each application must be engineered separately, with size, voltage, and temperature desired entering into the calculations. Reported uses include a strip heater for moisture control in a deep freeze unit, heat booster pads for tire repair machines, and foot warmer pads for cold floors. Other immediate uses foreseen by Goodrich are to free material frozen in chutes or bins, stop freezing in pipes, and temperature maintenance in hydraulic systems.

Goodyear Personnel Changes

The Goodyear Tire & Rubber Co., Akron, O., last month announced the following changes among its personnel.

William H. Abernethy has been named special representative of the chemical division, with headquarters at Birmingham, Ala. Mr. Abernethy's assignment to the southeastern district is one in a series of placements throughout the country, assuring expert technical service on Goodyear's chemical raw materials for the various industries. The Alabama man is well qualified in the fields of protective coating formulations, and rubber, vinyl, and adhesive compounding, having served four years in the Goodyear research laboratories at Akron. Besides for two years he was a research chemist at the Southern Research Institute and for about a year was with the Sloss-Sheffield Steel & Iron Works.

Roy Wallace has been named to a technical service post in Goodyear's chemical division. He will supervise test installations and applications of Goodyear's growing list of chemical products and will assist in the preparation of technical literature. He came to Goodyear in June, 1948, and after specialized training in paint formulation, rubber compounding, and rubber and resinous latices, was assigned to the chemical division.

W. D. Bradshaw, of the technical division of mechanical goods in Goodyear's Wolverhampton, England, plant, returned to his native land, July 21 after completing six months' special training in the company's mechanical goods plants in the United States. Mr. Bradshaw joined the organization in 1928 in the engineering division of the Wolverhampton plant. He became associated with the mechanical goods development department in England in 1939, and was made assistant to the assistant manager of mechanical goods design in 1943.

Sterling Melcher has been added to the staff of Goodyear's builders' supply and flooring department. He will assist in establishing and directing the company's merchandising program for its newly developed Vinyl flooring materials. The company held a preview of the new line at the Palmer House in Chicago while the Summer Furniture Mart was in progress, starting July 5, and also plans a formal introduction of the complete line on a national scale during the January furniture show.

E. M. Burger, who recently completed a training course in foreign operations at Goodyear's Plant Two, Akron, has been assigned to the company's Mexico City plant as manager of mechanical goods development and technical service. Mr. Burger joined Goodyear in 1943, becoming a development engineer in mechanical goods design; he was appointed section head of mechanical goods inspection and analysis in January, 1948.

Paul R. Fritsch, since 1936 manager of the identification division of the Goodyear advertising department, has been named a member of the new standardization committee for the American Society for Testing Materials. This committee will be concerned with test methods and specifications in the field of porcelain enamel products.

Distributers Appointed

Goodyear's Airfoam department has appointed Merryweather Foam Latex Co., Akron, a distributer of its foamed rubber material to service furniture and mattress manufacturers, hospital, automotive supply and upholstering jobbers in Ohio, Kentucky, West Virginia, Western Pennsylvania, and Indiana. The concern will operate a complete fabricating plant for making Airfoam cushioning units, lending its specialized services to customers in all allied fields. Merryweather has appointed Lee Slack technical service representative for customers in the West Virginia, Kentucky, and Southern Ohio territory. His headquarters are at 706 W. Sixth St., Huntington, W. Va.

Goodyear's Airfoam cushioning will be used in a complete line of mattresses to be marketed soon by Englander Co. According to Ira M. Pink, Englander president, the new mattresses with companion box springs will be presented to retailers in the very near future, backed by a program of advertising, sales training, and displays. This association of Englander and Goodyear is the first where a major sleep-equipment manufacturer joins forces with a leading rubber manufacturer in marketing and manufacturing sleep products under a joint name.

To insure higher-quality vinyl film products for the consumer, Goodyear has entered into a contractual agreement with Velveray Corp., New York, N. Y., naming that company a national distributer of Goodyear vinyl film. The announcement, made jointly by Samuel M. Schwartz, Velveray president, and C. P. Joslyn, manager of Goodyear's general products division, emphasized that the agreement was the first in the industry to provide for quality control of the product through all stages up to the consumer. Goodyear manufactures the vinyl resin at Niagara Falls, N. Y., from whence it is shipped to the company's plant at Akron to be made into film. Velveray then takes the finished film and handles printing, decorating, styling, merchandising, and selling problems. Quality control laboratories are maintained by both companies to insure production of flawless film. Mr. Joslyn also stated that Goodyear would concentrate strongly in the vinyl plastics field in the future, and that the agreement with Velveray would help insure the success of that operation.

Plant Maintenance Show

The first Plant Maintenance Show and Conference, devoted exclusively to cost reduction through improved installation, operation, and maintenance of equipment and services in factories, warehouses, and other plants, will be held in the Auditorium, Cleveland, O., on January 16-19, 1950. The Show will be under the management of Clapp & Poliak, Inc., while the conference will have L. C. Morrow, editor of *Factory Management & Maintenance*, as general chairman. Exhibits and conference subjects will cover mechanical rubber goods, including belts, hose, and packing; paints and product finishes; air conditioning, heating, and ventilating; building materials and services; electrical equipment; instruments and meters; management consultation services; materials handling; power generation and distribution; and others.

Navy Purchasing Office, 111 E. 16th St., New York, N. Y., recently awarded contracts for the following: 26,500 feet of matting, rubber with cotton fabric, to Boston Woven Hose & Rubber Co., Cambridge, Mass., and 13,500 feet, to Quaker Rubber Corp., Philadelphia, Pa.; 2,000 raincoats, Croydon Clothes, Philadelphia.

Jefferson Chemical Co., Inc., 711 Fifth Ave., New York 22, N. Y., has appointed William J. Peppel director of its new Austin, Tex., laboratories, and Charles H. Novotny manager of the laboratories. Dr. Peppel will be in charge of all technical activities at the laboratories, while Mr. Novotny will be responsible for general management including construction, purchasing, services, and public relations. Assisting Dr. Peppel in the direction of the various divisions at Austin will be: John W. Waldron, assistant director of the laboratories and director of the process development division; J. David Malkemus, director of the products application division; Granville W. Burtt, director of the analytical and testing division; and Martin M. Padwe, librarian in charge of the library and abstracting division.

Bardon Rubber Products Co., which last May suffered the complete loss by fire of building and equipment at Somers, Wis., is erecting a new factory at Union Grove, Wis. The fireproof building will be 62 by 92 feet of cement block construction. President Donald J. Rasor expects production to start about August 29, with 25 employes at first. The firm specializes in high-grade mechanical rubber goods.

NEWS ABOUT PEOPLE

Affiliated Photo—Conway

Palmer J. Lathrop

Spencer W. Pitts

M. H. Leonard

Palmer J. Lathrop was elected president of Cameron Machine Co., 61 Poplar St., Brooklyn 2, N. Y., at a special board meeting on July 7, to succeed Howard Kinsey, who died June 25. Mr. Lathrop, with Cameron since September, 1948, and a director of the company for many years, served most recently as executive vice president of the organization. He had formerly been vice president in charge of production at Bristol-Myers Co. Mr. Lathrop, an alumnus of Princeton University, during the late war served as a major in the Air Corps.

Alan E. Aune has resigned as manager of aircraft and automotive wire sales for United States Rubber Co. to join Burndy Engineering Co., Inc., New York, N. Y., to direct the national sales activities of the company's electrical products for the automotive after-market.

Robert E. Hathaway has been appointed New England sales representative, with headquarters in Boston, Mass., of C. K. Williams & Co., East St. Louis, Ill. Mr. Hathaway, who formerly was with the chemical division of General Electric Co., working on industrial finishes, resins, and allied products, will assist Elmer H. Kroepel.

Joseph W. Smith, formerly assistant purchasing agent of Brunswick-Balke-Collender Co., has joined the sales staff of Kraft Chemical Co., Inc., 917 W. 18th St., Chicago 8, Ill. He will concentrate on sales in the Midwest.

Kenneth K. Stowell has been appointed vice president in charge of eastern operations of Giffels & Vallet, Inc., and L. Rossetti, engineers and architects, 1000 Marquette Bldg., Detroit 26, Mich., with New York offices at 500 Fifth Ave. Mr. Stowell, who succeeds Edward X. Tuttle, has been editor-in-chief of *Architectural Record* since 1942 and will continue as chairman of its editorial board.

Spencer W. Pitts, assistant to the president of the J. M. Huber Corp., producer of carbon black, kaolin clay, oil and gas, and printing inks, 342 Madison Ave., New York 17, N. Y., has been elected secretary of the company by the board of directors. He will also continue as assistant to President H. W. Huber. Before joining the corporation in 1945, Mr. Pitts was for four years assistant general counsel in the legal division of the War Production Board and for three years prior had been assistant solicitor for the United States Department of Labor.

William T. Hunter recently was honored at a buffet luncheon in the Brooklyn plant of Scovill Mfg. Co., when he received a 50-year service award and pin. Mr. Hunter has been an officer of A. Schrader's Son since 1910 and was general manager from 1922 to December, 1948. He continues as vice president and director of Scovill Mfg. Co., Waterbury, Conn., and as president of A. Schrader's Son, Inc., Brooklyn, N. Y.

Fred L. Ford has been named director of sales for Athol Mfg. Co., Athol, Mass. He will make his headquarters at the firm's New York, N. Y., office, 120 E. 42nd St., New York, N. Y.

Raymond T. Wallace, former Fresno Police Chief, has purchased from J. C. May, a half interest in the O.K. Rubber Welders concern at 805 N. First St., Fresno, Calif.

Burton W. Schroeder has been appointed manager of fatty acid sales for Archer-Daniels-Midland Co., 600 Roanoke Bldg., Minneapolis 2, Minn. With the company since 1939, except for wartime naval service, Mr. Schroeder has experience in technical service and laboratory control work, marketing studies, and research in oils and industrial proteins for protective coatings. Prior to his new appointment, Mr. Schroeder was in charge of the industrial cereal products division.

M. H. Leonard has been appointed technical service representative in the Akron, O., office of Binney & Smith Co., New York, N. Y. Mr. Leonard received his B.S. degree in chemical engineering from Northeastern University and became affiliated with Firestone Tire & Rubber Co. after graduation. In 1947 he was appointed chief chemist of its Buenos Aires plant. He is a member of the Akron Rubber Group, American Chemical Society, American Institute of Chemical Engineers, and also a licensed Professional Engineer in the State of Ohio.

S. M. Murray recently left Gutta Percha & Rubber Co., Ltd., Toronto, Ont., to join Joseph Stokes Rubber Co., Ltd., Welland, Ont.

Morris S. Rosenthal, president of Stein, Hall & Co., Inc., 285 Madison Ave., New York, N. Y., at a luncheon in New York last month was awarded the decoration of "Officier du Merite Commercial" by the French Chamber of Commerce in the United States. The medal and accompanying scroll were presented to Mr. Rosenthal by Raymond Dreux, French Commercial Counselor in Washington, in recognition of his services in behalf of international trade. In addition to his business activities in the field of foreign trade, Mr. Rosenthal is well known as the author of books and articles on many aspects of exporting and importing and until recently as a lecturer at Columbia University.

R. C. Chilton is now sales manager of industrial and automotive adhesives, including newly developed adhesives for bonding vinyl plastics and for the application of flock, for Permalastic Products, 2321 Wolcott Ave., Ferndale 20, Mich. He formerly was with the industrial adhesives division of United States Rubber Co.

H. F. Walters has been appointed assistant production manager of A. Schrader's Son Division of Scovill Mfg. Co., Inc., Brooklyn 17, N. Y., to succeed Robert Rounds, now manufacturing superintendent of the plant. Mr. Walters joined the Schrader organization in 1920.

Reed Williams has been appointed works manager of the Johnson Rubber Co., Middlefield, O. He was with The B. F. Goodrich Co. for the past 23 years, most recently as chief engineer of the Cadillac, Mich., plant.

Bradley Dewey, president of Dewey & Almy Chemical Co., Cambridge, Mass., recently was elected a trustee of American Optical Co.

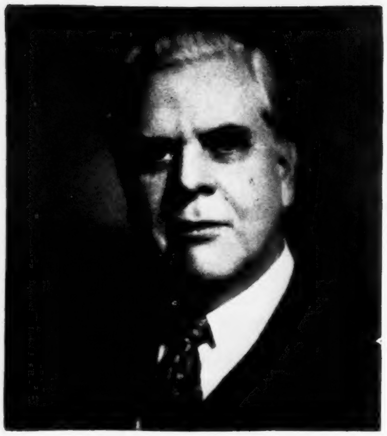
J. H. Fielding, who recently resigned as manager of compound development at Goodyear Tire & Rubber Co., is now head of the compounding division of the development department of The Armstrong Rubber Co., West Haven 16, Conn., which also operates plants at Des Moines, Iowa, and Natchez, Miss.

H. H. Todd has been elected vice president of The Hamilton Rubber Mfg. Corp., Trenton, N. J. For 30 years "Hobe" Todd has been in charge of company sales in the Midwest.

CANADA

Polymer Corp., Sarnia, Ont., disclosed that its 1949 budget provides for capital expenditures totaling $2,250,000. Principal expenditure will be $1,100,000 for ethane cracking furnaces designed to double the company's output of ethylene and to provide for increased sales to Dow Chemical of Canada, Ltd. Increased production will also enable Polymer to boost its own output of styrene. The budget announcement, made at the annual meeting of the company's board of directors on June 25, also disclosed that ways and means of increasing Polymer's ethylene production had been studied since the latter part of 1948, when it became apparent that ethylene production was insufficient to meet the combined requirements of Polymer and Dow. As a result of the cooperative arrangement, certain ethane cracking furnaces, surplus to Dow's operations at Freeport, Tex., were made available to Polymer. The erection of the furnaces is already well advanced at Polymer, and the bulk of the construction work is expected to be completed late this summer. Some additional supplies of ethylene will be available by the end of August, it was said. Contract arrangements now being completed between Dow and Polymer will call for the daily delivery of an average of 60,000 pounds of ethylene to Dow.

Mailman Corp., Ltd., formerly British Rubber Co. of Canada, Ltd., Montreal, P. Q., in its first annual report to shareholders for the year ended April 30, reported that although sales of its British Rubber Division were lower than in the preceding fiscal year, owing to the late and mild winter, with consequent decline in demand for rubber footwear, results for the division were still satisfactory. President A. L. Mailman further declared that the division is now broadening its scope by adding new footwear items as well as a number of mechanical rubber goods items.



Harold Clyde Kinsey

Rubber Consumption Up

Consumption of rubber in Canada increased in May to 13,217,000 pounds from 13,054,000 in April, the Dominion Bureau of Statistics reports. Natural rubber consumption rose to 7,154,000 pounds from 6,888,000; reclaim to 2,304,000 pounds from 2,218,000; while synthetic dropped to 3,760,000 from 3,948,000.

In terms of end-product use, the consumption of all rubber in the production of tires and tubes, including tire repair material, decreased by 36,000 pounds, and in all other products by 60,000 pounds. Consumption in rubber footwear rose by 260,000 pounds, and in wire and cable by 1,000 pounds.

Domestic production of synthetic rubber in May totaled 10,176,000 pounds, against 7,562,000 pounds in April; while reclaim advanced to 692,000 pounds, from 569,000.

Month-end stocks of natural rubber moved up to 16,782,000 pounds from the April total of 16,128,000 pounds; synthetic to 10,651,000 pounds from 9,530,000; and reclaim to 4,090,000 pounds from 4,003,000.

Dominion Rubber Co., Ltd., Montreal, P. Q., has been awarded by the City of Montreal Executive Committee a contract to supply 8,000 feet of hose for the fire department. Dominion Rubber was the lowest bidder, with a quotation of $1.65 a foot.

OBITUARY

James M. Davidson

JAMES M. DAVIDSON, superintendent of the Buffalo, N. Y., plant of Farrel-Birmingham Co., Inc., Ansonia, Conn., died July 15 following a brief illness. Mr. Davidson's entire business career was with Farrel-Birmingham, and his appointment as plant superintendent in 1946 climaxed his steady progress with the company from the time of his first employment as office boy in 1920.

Mr. Davidson is survived by his wife, a daughter, and three brothers.

Harold Clyde Kinsey

HAROLD CLYDE KINSEY, president of Cameron Machine Co., 61 Poplar St., Brooklyn 2, N. Y., died at his home in Brooklyn on June 25 after a protracted illness.

Born in Philadelphia in 1882, he spent most of his life in the publishing business, first with John Wanamaker in Philadelphia, then with Doubleday Page & Co., and later with the Cosmopolitan Book Co., of which he was publisher. He resigned this position in 1932 to found the company which bore his name.

Mr. Kinsey was for many years a director of Cameron Machine, and in order to devote his full time to the machinery business during the war, he sold his book business in 1943 and became president of Cameron Machine Co.

The deceased was a member of the Dutch Treat Club, and the Players and a past president of the American Association of Booksellers.

He is survived by his daughter, a grandson, and a sister.

Funeral services were held June 27 at St. Ann's Episcopal Church, Brooklyn. Interment took place the next day at Barrett's Chapel, Frederica, Del.

Henry Perlish

HENRY PERLISH, former vice president of Charles T. Wilson Co., Inc., crude rubber importer, 120 Wall St., New York, N. Y., died June 19 in a Queens, L. I., N. Y., hospital following a brief illness. Retired since 1945, he had been associated with the company since 1914.

Mr. Perlish was born in Philadelphia, Pa., 60 years ago. Prior to joining the Wilson concern, he had been employed by the Wilson Trading Co., starting there in 1907.

A former member of the New York Commodity Exchange, the deceased was also a member of the Pre-Canceled Stamp Society, the Society of Philatelic America, and the Elks.

Funeral services were held June 21 at Park West Chapel, Far Rockaway, L. I.

Survivors include the widow, two sons, two daughters, four grandchildren, a sister, and four brothers.

Wm. M. Metzler

ONE of the best-known veterans of the Akron rubber industry, William M. Metzler, passed away on July 23. Consulting superintendent of the mechanical goods division, Goodyear Tire & Rubber Co., Akron, O., the deceased had completed 63 years of service in the rubber industry on February 1, 1949.

He entered the industry on February 1, 1886, and became interested in compounding. Then he left Akron in 1892 to join an eastern rubber manufacturing concern, but returned in 1894 as assistant superintendent of the old Diamond Rubber Co. Mr. Metzler came to the Goodyear organization in 1927 as superintendent of its new mechanical goods division.

He also belonged to the Holy Name Society and the Knights of Columbus. Mr. Metzler was born in Akron on September 26, 1870.

Requiem Mass was said in St. Sebastian's Church on July 27, followed by interment in St. Vincent's Cemetery.

Surviving are the widow, two sons, and two daughters.

Patents and Trade Marks

APPLICATION

United States

2,471,465. **In a Housing for Electrical Apparatus Included in a Submarine Coaxial Cable System Including a Copper Sheath, a Continuous, Adherent Coating of Polythene Overlying the Copper Sheath and a Portion of the Cable.** M. van Hasselt, London, England, assignor to International Standard Electric Corp., New York, N. Y.

2,471,658. **In a Casing Head Assembly Including a Tubular Body, Rubber-Type Packing Bands Mounted Concentrically on a Crown Ring Seated on the Bore Wall of the Body.** D. U. Shaffer and F. J. Schweitzer, Jr., both of Brea, Calif., assignors to Shaffer Tool Works, a corporation of Calif.

2,471,679. **In an Oil Seal for Coaction with Movable Parts, at Least One Member Made of a Resilient Material Susceptible of Swelling in Section When Subjected to Certain Fluids.** A. F. Gardner, Birmingham, Mich., assignor to Chicago Rawhide Mfg. Co., Chicago, Ill.

2,471,725. **In a Mixing Valve, a Resinous Lining Sleeve Sealed to the Interior of the Hollow Valve Body.** W. B. Clifford, Boston, Mass.

2,471,736. **Cover of Rubber-Like Material for a Baseball Base.** J. G. Fleming, Pawtucket, R. I., and W. J. Klem, Miami Beach, Fla., assignors, by mesne assignments, to J. G. Fleming.

2,471,894. **Airfoil Ice Remover Including a Resilient Cover and Means to Distort This Cover.** W. A. Pulver, Sherman Oaks, assignor to Lockheed Aircraft Corp., Burbank, both in Calif.

2,471,969. **The Combination of Driving and Driven Sheaves, at Least One of Which Has a W-Shaped Annular Groove and a Power Transmission Belt Having Spaced Surfaces for Cooperation with the Inclined Surfaces of the Groove.** W. A. Meyer, Wauwatosa, assignor to Allis-Chalmers Mfg. Co., Milwaukee, both in Wis.

2,472,009. **Surgical Dressing Having a Mid-Portion of Highly Elastic Material.** W. J. Gardner, Cleveland Heights, O., assignor to Cleveland Clinic Foundation, a corporation of O.

2,472,029. **Vibration Damping Mounting.** L. F. Thiry, Montclair, N. J., assignor to General Tire & Rubber Co., Akron, O.

2,472,128. **In a Method of Decorating Ceramic Ware, the Use of an Aqueous Dispersion of a Water-Insoluble Soft Synthetic Resin of the Group of Polymethacrylate, Polyethylacrylate, Polystyrene, Polyvinylidene Chloride, Polyvinylacetate and Neoprene.** H. C. Staehle, assignor to Eastman Kodak Co., both of Rochester, N. Y.

2,472,468. **In a Machine for Automatically Plucking Feathers from a Fowl, Including Two Spaced Rollers, Elastic Frictional Means on the Outer Surfaces of the Rollers.** E. B. Digby, Atlanta, Ga.

2,472,483-485. **Elongated, Flexible Catheter-Type Instrument.** L. H. Krippendorf, White Plains, assignor to American Catheter Corp., Port Chester, both in N. Y.

2,472,687. **Anti-Splash Device for Attachment to the Heels of Shoes, Etc.** E. Wellwood, R. J. McBride, W. J. Greer, and J. Wellwood, all of Belfast, Northern Ireland.

2,472,754. **In a Method for Making and Maintaining an Impression of the Shape of an Object, Units Each of Which Includes a Container Wall of Flexible, Extensible, and Impervious Sheet Material Filled with a Deformable Mass.** W. J. Mead, Belmont, Mass.

2,472,884. **In a Cushioning Attachment for a Game Table, Rubber Cushioning Elements.** L. Colaluca, Somerville, N. J.

2,472,940. **Strapless Brassiere Including a Body of Flexible Rubber.** A. H. Cummings, Ventura, Calif.

2,473,062. **Surgical Bandage.** C. L. Kennedy, South Braintree, and K. W. Macdonald, Watertown, both in Mass., assignors to Seamless Rubber Co., New Haven, Conn.

2,473,099. **Trapper's Hiplength Boot.** J. M. Hatch, Castine, Me.

2,473,113. **For Supporting Hose at Full Length from the Thigh, a Shaped Band of Rubber to Which a Plurality of Clasps and Cooperating Buttons Are Attached.** R. J. Steere, Rockwood, Tenn.

2,473,142. **Artificial Fish Lure with a Sponge Rubber Body.** B. E. Gilmore, Windsor, Mo.

2,473,183. **Electrically Conductive Fabric Having a Film of Vinyl Resin Compounded with Carbon Black.** W. Watson, Auburn, Me., assignor to Bates Mfg. Co., a corporation of Me.

2,473,267. **In a Bearing Housing Including a Grooved Recess for a Bearing, an Annular Ring of Resilient Material in the Groove for Cushioning the Bearing.** L. W. Wightman, Fort Wayne, Ind., assignor to General Electric Co., a corporation of N. Y.

2,473,335. **Resilient Rubber Disk in a Vibration Damper for Rotating Shafts.** J. A. Hardy, assignor to Schwitzer-Cummins Co., both of Indianapolis, Ind.

2,473,379. **Flexible Liner in a Milking Machine Teat Cup.** H. O. Lindgren, Appelviken, assignor to A. B. Separator, Stockholm, both in Sweden.

2,473,452. **Resilient Pressure and Suction Cup in a Device for Cleaning Drain Pipes, Etc.** E. L. Scott, Mission, Kan.

2,473,646. **Expander Tube for Brakes.** C. Hollerith, Jackson, Mich., assignor, by mesne assignments, to B. F. Goodrich Co., New York, N. Y.

2,473,740. **Waterproof Garment.** E. Welch, Valley Falls, R. I.

2,473,773. **Soft Rubber Massaging Element Mounted on a Toothbrush.** H. D. West, Bay City, assignor of one-half to E. Kushmaul, Saginaw, both in Mich.

2,473,922. **Breathing Indicator.** C. A. Tobias, Berkeley, Calif.

2,473,985. **Plastic Insulated Electrical Conductor.** L. A. Brooks, Stamford, Vt., assignor to Sprague Specialties Co., North Adams, Mass.

2,474,047. **Inflatable Plug for Sealing Bores.** A. Gorzkowski, Avoca, Pa.

2,474,132. **Piston Sealing Means Including a Sealing Ring of Rubber-Like Material.** S. Vernet, Yellow Springs, O.

2,474,292. **For Use in Laminating Plywood, Adhesive Tape Impregnated throughout with a Synthetic Resin.** C. L. Weidner, New Brunswick, and L. W. Eger, Perth Amboy, both in N. J., assignors to Industrial Tape Corp., a corporation of N. J.

2,474,356. **Connector Attachment for Electric Light Bulbs to be Attached to a Tree, Including a Hollow Horse-Shaped Body of Rubber and a Separate Rubber Sheet Forming the Outer Side of the Body.** E. W. Harris, Detroit, Mich.

2,474,431. **Clamp in Combination with a Relatively Thick Sleeve of Elastic Material for the Reception of Adjacent End Portions of Tube Sections.** M. S. Lipman, Hempstead, and W. W. Godon, Freeport, assignors to Republic Aviation Corp., Farmingdale, all in N. Y.

2,474,512. **In Apparatus for Eliminating Pressure Pulsations in a Liquid Stream, Including a Pair of Vessels Connected to a Line, a Flexible Bladder-Like Diaphragm in Each Vessel.** I. C. Bechthold, Whittier, F. M. Stephens, Los Angeles, and C. Newman, Hollywood, assignors to Fluor Corp., Ltd., Los Angeles, all in Calif.

2,474,535. **Protective Cot.** S. J. Krannak, St. Paul, Minn.

2,474,772. **In a Valve for High-Pressure Hydraulic Systems, Rubbery Sealing Rings.** B. N. Ashton, assignor to Electrol, Inc., both of Kingston, N. Y.

2,474,801. **Sheet Formed from an Aqueous Dispersion of Paper-Making Fibers and Dispersed Particles of Butadiene-Styrene Copolymer.** A. F. Owen, assignor to Latex Fiber Industries, Inc., both of Beaver Falls, N. Y.

Dominion of Canada

456,835. **Fabric Including Liquid-Absorbent Weft Threads, and Polyvinyl Chloride Coated, Non-Absorbent Warp Threads.** J. C. Torrington, Tapah, Perak, Malayan Union.

456,895. **Soft, Pliable Collar Interliner Consisting of an Open-Weave Fabric Having a Discontinuous Coating on Both Sides of a Vinyl Chloride Resin Composition.** D. McBarney, Newburgh, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., both in the U. S. A.

456,905. **In a Sealing Ring, an Elastic Rubber Ring and a Cushioning Band of a Rubber Softer than the Ring.** H. M. Dodge, Wabash, Ind., assignor to General Tire & Rubber Co., Akron, O., both in the U. S. A.

456,987. **In a Leg Support for Drivers of Motor Vehicles, Including an Adjustable Stand Attached to the Floor, One or More Rollers of Rubber, Sponge Rubber, or Upholstery at the Upper End of the Stand.** J. W. Garner, Driffield East, Yorkshire, England.

457,048. **In a Valve Core, Including a Barrel and a Valve Pin Movable therethrough, a Valve Member of Rubber-Like Material Mounted on the Pin.** J. C. Crowley, Cleveland Heights, assignor to Dill Mfg. Co., Cleveland, both in O., U. S. A.

457,066. **Curing Bag.** T. E. Thomas, Cuyahoga Falls, assignor to Firestone Tire & Rubber Co., Akron, both in O., U. S. A.

457,160. **For Hygienic Attachment of Rubber Nipples to Feeding Bottles, a Rubber Thimble.** V. A. Cory, W. R. Clark, and J. M. Potter, all of Victoria, B. C.

457,224. **Resilient Pad Having a Fibrous Core Element and, as Covering Element, an Elastomer Integrated with the Outside of the Core Element.** C. H. Schuh, St. Petersburg, Fla., U. S. A., assignor to Carbide & Carbon Chemicals, Ltd., Toronto, Ont.

457,233. **Resin-Impregnated Textile Strand.** W. R. Hoover, Mishawaka, Ind., U. S. A., assignor to Dominion Rubber Co., Ltd., Montreal, P. Q.

457,285. **Flexible Seal.** K. A. Beier, assignor to Schwitzer-Cummins Co., both of Indianapolis, Ind., U. S. A.

457,297. **In a Delay Device Including Pairs of Transducers, a Common Low-Velocity Transmission Medium Connecting the Transducers Made of Cellulose Acetate Butyrate or a Polyester Plastic.** J. A. Hall, Summit, and W. P. Mason, West Orange, both in N. J., assignors to Bell Telephone Laboratories, Inc., assignor to Western Electric Co., Inc., both of New York, N. Y., both in the U. S. A.

457,339. **In a Face Mask Goggle, a Unitary Face Piece of Resilient Material.** W. H. Lehmberg, Riverside, Conn., assignor to American Optical Co., Southbridge, Mass., both in the U. S. A.

457,360. **In Non-Glare Safety Glass, a Layer of Plasticized, Polymerized Incomplete Vinyl Resin on the Inner Face of Each of Two Glass Sheets, and between the Layers of Vinyl Resin, a Sheet of Hard Cellulosic Material in Which Light-Polarizing Particles Are Embedded.** E. L. Fix, New Kensington, Pa., U. S. A., assignor to Duplate Canada, Ltd., Oshawa, Ont.

457,383. **An Expander Tube Including an Endless Annular Body of Rubber-Like Material Having a Core-Molded Interior Surface Defining an Annular Inflation Cavity.** R. J. Keller, Dayton, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

457,388. **Ice Pack for Application to the Human Body, Including a Bag of Thin Flexible Rubber.** J. M. Kearney, New Britain, Conn., assignor to Hot-R-Cold Pak, Inc., New York, N. Y., both in the U. S. A.

457,420. **In a Seal Construction for a Shaft and Impeller Assembly, a Deformable Rubber-Like Bushing Surrounding the Shaft.** J. A. Newton and N. Hoertz, assignors to Thompson Products, Inc., all of Cleveland, O., U.S.A.

457,441. **For Supporting Air Flow Means in a Vacuum Cleaner Tank, Resilient Means Including a Plurality of Rubber Sandwiches.** F. C. Doughman, Darien, Conn., U. S. A.

457,452. **Ski Retainer Means Including a Central, Rigid Separator Block Covered with Resilient Material, and Resilient End Separator Blocks Having Integral Elastic Extensions.** H. R. Lynn, Montreal, P. Q.

457,508. **Crinkled Cushion Padding of Spongy Rubber-Like Material.** E. A. Eakins, Mishawaka, Ind., U. S. A., assignor to Dominion Rubber Co., Ltd., Montreal, P. Q.

457,520. **Sectional Curing Bag.** J. E. Charnes, assignor to Firestone Tire & Rubber Co., both of Akron, O., U. S. A.

457,530. **In a Mandrel for Feed Reels Including Two Coaxial Supporting Heads, a Block of Elastic Material, as Rubber, Mounted on Each Head.** R. Brunner, Beaver, assignor to Jones & Laughlin Steel Corp., Pittsburgh, both in Pa., U. S. A.

United Kingdom

622,488. **Windshield Wipers.** Trico Products Corp.

622,514. **Resilient Bush.** Metalastik, Ltd., and C. Grantham.

622,524. **Pneumatic Motors and Packing Rings for the Pistons thereof.** Trico Products Corp.

622,575. **Ironing Board Pads.** United States Rubber Co.

622,620. **Resilient Seats for Passenger Transport Vehicles.** S. A. G. A. Soc. Applicazioni Gomma Antivibranti.

622,798. **Vaginal Irrigator.** J. A. Leu.

622,803 **Collapsible Baths and Cots.** J. P. Ellison, Ltd., and T. Heyes.

622,996. **Laminated Waterproof Fabrics.** Sylvania Industrial Corp.

623,010. **Conveyer Belts.** S. B. Matheiu.

623,044. **Inflatable Dinghies and Like Craft.** R. F. D. Co., Ltd., and H. M. L. and R. L. Williams, legal representative of P. W. L. Williams, deceased.

623,311. **Electric Cables.** Pirelli - General Cable Works, Ltd., and R. Bean.
623,397. **Piston Packing.** Wingfoot Corp.
623,558. **Breathing Apparatus and Apparatus for Administering Gases.** Siebe, Gorman & Co., Ltd., and Sir R. H. Davis.
623,730. **Electric Cables.** Telegraph Construction & Maintenance Co., Ltd., J. N. Dean, and E. W. Smith.
623,748. **High-Frequency Cables.** Telegraph Construction & Maintenance Co., Ltd., J. N. Dean, and E. W. Smith.
623,944. **Hose Couplings.** Imperial Chemical Industries, Ltd., Wilkinson Rubber Linatex, Ltd., H. G. Hawkins, and P. J. Schofield.
624,039. **Windshield Cleaning Device.** Trico Products Corp.

PROCESS

United States

2,471,752. **Covering Wire Conductors with Inner and Outer Coverings of Plastic Material.** J. H. Ingmanson, New Haven, assignor to Whitney Blake Co., Hamden, both in Conn.
2,471,905. **Adhering Butyl Rubber to Metal.** W. C. Smith, Elizabeth, N. J., assignor to Standard Oil Development Co., a corporation of Del.
2,472,037. **Finishing Polymers.** W. A. Wurth, Cranford, and S. C. Lane, Roselle, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.
2,472,551. **Surface Decorated Plastic Sheets.** R. L. Smith, Amherst, N. H., assignor to Nashua Gummed & Coated Paper Co., Nashua, N. H.
2,473,024. **Layered Article of Rubber and Fibrous Material.** J. Gregg, New Hope, Pa.
2,473,722. **Hollow, Colored Flexible Articles.** A. A. Nelson, Pleasant Ridge, Mich.
2,473,723. **Making Hollow Artificial Body Members for Prosthesis from a Vinyl Plastic.** A. A. Nelson, Pleasant Ridge, Mich.
2,473,784. **Splicing a Pneumatic Rubber Tube.** J. C. Carlin and R. R. Lloyd, both of Norristown, assignors to Lee Rubber & Tire Corp., Conshohocken, both in Pa.
2,474,013. **Rebuilding a Worn Tread Lug of a Rubber Tire.** V. Rawls, assignor to Rawls Bros. Co., both of Lima, O.
2,474,201. **Making Microporous Sheet from an Elastomer with the Aid of Wool Fibers.** J. J. Raymond, Newburgh, N. Y., and W. H. Lehmberg, Riverside, Conn., assignors to American Felt Co., Boston, Mass.

Dominion of Canada

456,913. **Producing Artificial Threads, Filaments, Etc., from Polythene.** G. Loasby, Coventry, England, assignor to Canadian Industries, Ltd., Montreal, P. Q., assignor to Imperial Chemical Industries Ltd., London, England.
456,914. **Elastic Filaments from Polythene.** R. B. Richards, Northwich, England, assignor to Canadian Industries, Ltd., Montreal, P. Q., assignor to Imperial Chemical Industries, Ltd., London, England.
456,942. **Casting a Material of the Type which Shrinks as It Congeals from Its Fluid State to Its Normally Solid Form.** H. P. Heller, Palyra, N. J., assignor to Radio Corp. of America, New York, N. Y., U. S. A.
457,307. **Reclaiming Rubber.** P. A. Gibbons, London, assignor to and co-inventor with F. H. Cotton, East Barnet, both in England.
457,361. **Extruding Synthetic Polymeric Materials.** L. A. Burrows, Woodbury, N. J., C. B. Van Winter, Wilmington, Del., and W. E. Lawson, Wenonah, N. J., both in the U. S. A., assignors to Canadian Industries, Ltd., Montreal, P. Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.
457,473. **Annealing Calendered Thermoplastic Material.** W. R. Wheeler, Plainfield, N. J., U. S. A., assignor to Carbide & Carbon Chemicals, Ltd., assignor to Bakelite Co. (Canada), Ltd., both of Toronto, Ont.

United Kingdom

622,976. **Printing on Pliable Elastic and Thermoplastic Materials.** L. Rado.
623,106. **Constructing Roads, Aerodromes, and Floors.** N. V. De Bataafsche Petroleum Mij.
623,600. **Compounding Elastogenic Material.** P. May (General Tire & Rubber Co.).
623,631. **Manufacture from Plastics of Flat Articles Having a Pattern of Lattice, Lace, or Like Configuration.** F. M. Prestwich.
624,174. **Articles of Thermoplastic Resins.** S. P. A. Lavorazione Materie Plastiche.

CHEMICAL

United States

2,470,479. **Making Polysiloxane Resins.** C. S. Ferguson, Troy, and C. E. Welsh, Schenectady, both in N. Y., assignors to General Electric Co., a corporation of N. Y.
2,470,497. **Preparation of Polysiloxane Resins.** H. F. Lamoreaux, Ballston Lake, N. Y., assignor to General Electric Co., a corporation of N. Y.
2,470,545. **Vulcanizing a Butadiene Rubber in the Presence of a Di(Hydroxy Aryl) Sulfide as Sole Vulcanizing Agent.** E. S. Blake, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.
2,470,555. **Condensation Product Obtained by Heating a Mercapto Thiazole with Formaldehyde and Ammonia in Aqueous Medium.** M. W. Harman, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.
2,470,562. **Production of an Organosilicon Composition.** J. F. Hyde, assignor to Corning Glass Works, both of Corning, N. Y.
2,470,629. **Emulsion Polymerization of Butadienes.** G. P. Mack, Jackson Heights, assignor to Advance Solvents & Chemical Corp., New York, both in N. Y.
2,470,651. **Insulating Coating Including Thermoset Resinous Condensation Product of an Aryl Polyoxy Polycarboxylic Acid and a Polyhydric Alcohol.** G. S. Schaffel, Pittsburgh, assignor to Westinghouse Electric Corp., East Pittsburgh, both in Pa.
2,470,752. **Interpolymer Produced from Polyhydric Alcohol Polybasic Acid, and Interpolymer of Monovinylaromatic Compound, Olefinic Acid and Drying Oil or Oil Fatty Acid.** E. G. Bobalek, assignor to Arco Co., both of Cleveland, O.
2,470,757. **Resinous Interpolymer of Monovinylaromatic Compound, Monocarboxylic Olefinic Acid and Drying Oil or Acid.** E. G. Bobalek, assignor to Arco Co., both of Cleveland, O.
2,470,761. **Glue or Varnish Composition Including a Solution of Polyvinyl Chloride and Benzaldehyde.** J. Delorme, Bron, and R. Bluma, Asnieres, assignors to S. A. des Manufactures des Glaces & Produits Chimiques de Saint-Gobain, Chauny & Cirey, Paris, all in France.
2,470,855. **Soluble Rosin Maleic Glycerine Esters.** W. Krumbhaar, New York, N. Y.
2,470,894. **Polyolefinic Hydrocarbons.** W. W. Johnstone, Riverdale, assignor to Universal Oil Products Co., Chicago, both in Ill.
2,470,904. **Polymerization of Olefinic Hydrocarbons.** W. B. Shanley, San Marino, Calif., assignor to Universal Oil Products Co., Chicago, Ill.
2,470,908-911. **Preparation of Granular Polymers of Vinyl Halides.** M. Baer, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.
2,470,945. **Di(Orthoacylaminoaryl) Disulfide Softeners for Natural and Synthetic Rubbers.** P. T. Paul, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.
2,470,946. **2,2'-Dithio Bis (N-Aryl Carbamic Ester) Softeners for Natural and Synthetic Rubbers.** P. T. Paul and L. B. Tewksbury, Jr., both of Naugatuck, Conn., assignors to United States Rubber Co., New York, N. Y.
2,470,947. **2,2'-Dithio Bis Propion Anilide Softeners for Natural and Synthetic Rubbers.** P. T. Paul, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.
2,470,948. **Di(Orthoacylaminoaryl) Disulfide Softeners for Natural and Synthetic Rubbers.** P. T. Paul, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.
2,470,949. **Di(Orthoacylaminoaryl) Disulfide Softeners for Isoolefin-Diolefin Copolymers.** P. T. Paul, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.
2,470,952. **Chlorinated Rubbers from Butadiene-Styrene Copolymers.** T. P. Remy, Los Angeles, Calif.
2,470,953. **Heat-Sensitive, Non-Tacky Flexible Film-Forming Composition Including an Oil-Modified Alkyd Resin Emulsion and an Oxidized Butadiene Polymer Emulsion.** J. W. Robertson, Englewood, and J. B. Rust, East Hannover, assignors, by direct and mesne assignments, of one-half to Montclair Research Corp., Montclair, all in N. J., and one-half to Ellis-Foster Co., a corporation of N. J.
2,471,023. **Highly Polymeric Linear Esters.** J. G. Cook, J. T. Dickson, and A. R. Lowe, Blackley, and J. R. Whinfield, Accrington, both in England, assignors to Imperial Chemical Industries, a corporation of Great Britain.
2,471,188. **Urea Resins Containing Aminoalkoxy Substituents.** R. W. Auten, Jenkintown, assignor to Rohm & Haas Co., Philadelphia, both in Pa.
2,471,230. **Resinous Composition from an Alkylene Primary Diamine and Residue Polycarboxylic Acids.** C. H. McKeever, assignor to Rohm & Haas Co., Philadelphia, Pa.
2,471,234. **Elastomer with Improved Milling Properties Obtained by Copolymerizing Alpha-Methylstyrene with a Mixture of 2-Methyl-1,3-Pentadiene and 4-Methyl-1,3-Pentadiene.** R. C. Morris, Berkeley, A. V. Snider, Richmond, and E. T. Bishop, Berkeley, assignors to Shell Development Co., San Francisco, all in Calif.
2,471,243. **Resinous Condensation Product of an Aldehyde and a Polycyanoacetamide Compound.** J. B. Rust, West Orange, N. J., assignor, by direct and mesne assignments, of one-half to Montclair Research Corp., and one-half to Ellis-Foster Co., both corporations of N. J.
2,471,266. **Vinyl Polymers Plasticized with Air-Blown Extracts of Mineral Oil Fractions.** E. W. M. Fawcett, E. S. Narracott, and K. J. Rowland, all of Sunbury-on-Thames, assignors to Anglo-Iranian Oil Co., Ltd., London, both in England.
2,471,267. **Vinyl Polymers Plasticized with Sulfur Treated Extracts of Mineral Oil Fractions.** E. W. M. Fawcett, E. S. Narracott, and A. Milliem, all of Sunbury-on-Thames, assignors to Anglo-Iranian Oil Co., Ltd., London, both in England.
2,471,272. **Water-Soluble Cellulose Ether Plasticized with a Cyclomethylene Sulfone.** G. W. Hooker, Sarnia, Ont., Canada, and N. R. Peterson, assignors to Dow Chemical Co., both of Midland, Mich.
2,471,396. **Aqueous Emulsions of Mixed Phthalic Glyceride and Melamine-Formaldehyde Resins.** D. W. Light, Longmeadow, Mass., assigner to American Cyanamid Co., New York, N. Y.
2,471,438. **Producing a Furfuryl Alcohol Resin.** P. L. McWhorter, Jr., Odessa, assignor to Haveg Corp., Newark, both in Del.
2,471,456. **Wool Shrinkproofing Bath Including Chloroprene Polymer, a Non-Cationic Emulsifying Agent and a Water-Soluble Neutral Salt of an Alkali Metal Conditioning Electrolyte.** J. B. Rust, Montclair, N. J., assignor to Montclair Research Corp., a corporation of N. J.
2,471,463. **Plasticizing Agent Consisting of Dialkyl Phenylphosphonate Containing from 4 to 8 Carbon Atoms in the Alkyl Group.** A. Dock Fon Toy, Chicago, Ill., assignor to Victor Chemical Works, a corporation of Ill.
2,471,464. **Preparation of Para Nitrophenyl Diethyl Thionophosphate.** A. Dock Fon Toy, Chicago, and T. M. Beck, Homewood, both in Ill., assignors to Victor Chemical Works, a corporation of Ill.
2,471,496. **Reclaiming Scrap of Vulcanized Natural Rubber Mixed with Butadiene-Styrene Polymer by Heating with Abietic Acid and Gray Tower Resin Oil Obtained in Refining Gasoline.** R. L. Randall, St. Louis, Mo., assignor, by mesne assignments, to Midwest Rubber Reclaiming Co., East St. Louis, Ill.
2,471,497. **Bonding Cellulose Surfaces with the Aid of a Composition Including Polyvinyl Alcohol, Formaldehyde and Hexamethylene Tetramine.** R. P. Roberts and K. Jones, both of Spondon, England, assignors, by mesne assignments, to Celanese Corp. of America, a corporation of Del.
2,471,500. **On a Metal Structure, Coats of a Mixture of a Synthetic Linear Polyamide and a Rubber-Like Composition; These Coats Are Graded to Contain a Greater Proportion of Polyamide in a Subsequently Applied Coat.** F. S. Stewart, Los Angeles, Calif., and V. R. Hardy, Wilmington, Del., assignors, by direct and mesne assignments, to Douglas Aircraft Co., Inc., Santa Monica, Calif.
2,471,525. **Reaction of an Acetylene with Hydrogen Fluoride to Produce Vinyl Fluoride and/or Difluoroethane and Homologs thereof.** J. C. Hillyer and J. F. Wilson, both of Bartlesville, Okla., assignors to Phillips Petroleum Co., a corporation of Del.
2,471,570. **An Adduct of a Compound of the Formula $RCH=CH_2$ Where R Is a Saturated Hydrocarbon Radical of 1 to 6 Carbon Atoms, and an Acid Chloride of a Chloracetic Acid Containing 2 to 3 Alpha-Chlorine Atoms.** M. S. Kharash and W. H. Urry, both of Chicago, Ill., assignors to United States Rubber Co., New York, N. Y.
2,471,575. **Preparation of 2,4-Dichlorophenoxyacetic Acid.** R. H. F. Manske, Guelph, Ont., Canada, assignor to United States Rubber Co., New York, N. Y.
2,471,600. **Preparation of a Convertible Furfuryl Resin Composition.** W. H. Adams, Jr., and H. H. Lebach, assignors to Haveg Corp., all of Newark, Del.
2,471,631. **Furfuryl Alcohol-Phenol Aldehyde Resinous Products.** H. H. Bebach, assignor to Haveg Corp., both of Newark, Del.
2,471,742. **Polymerization of Acrylonitrile.** S. A. Harrison, Stow, O., assignor to the B. F. Goodrich Co., New York, N. Y.
2,471,743. **Aqueous Emulsion Polymerization of Acrylonitrile in the Presence of an Aromatic Hydrocarbon.** S. A. Harrison, Stow, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,471,766. **Copolymer of Styrene and a**

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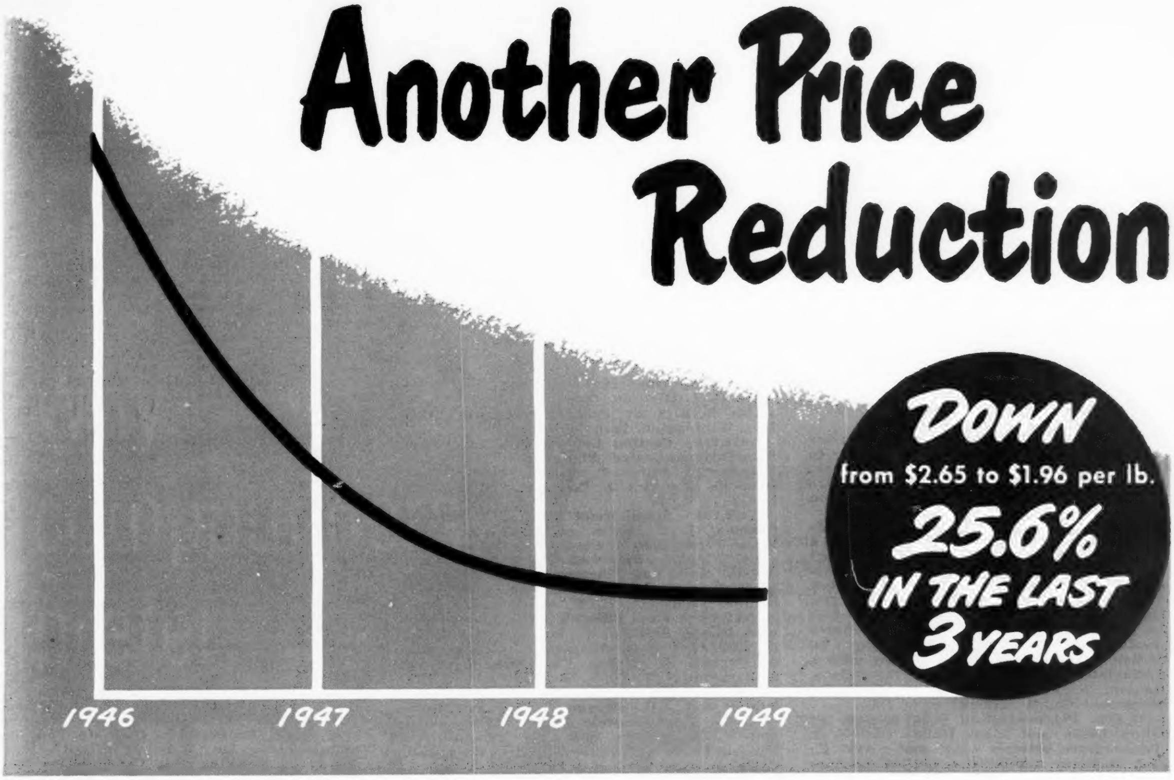

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Phenyl-Vinyl Acetate. D. T. Mowry and C. L. Mills, Jr., both of Dayton, O., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,471,767. **Reacting Alpha-Chloroacrylonitrile in an Aqueous Solution with a Water Soluble Cyanide to Obtain Fumaronitrile.** D. T. Mowry and W. H. Yanko, both of Dayton, O., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,471,785. **Interpolymer Including a Biphenyl Compound from the Class of Vinylbiphenyl, Vinylchlorobiphenyl and Vinylfluorobiphenyl Copolymerized with a Compound from the Group of Styrene, Alphamethylstyrene and Alpha, Para-dimethylstyrene.** R. B. Seymour and J. M. Butler, both of Dayton, O., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,471,789. **A Diester of Styrene Glycol Having a Nuclearly Substituted Hydrocarbon Group as Plasticizer for Natural and Synthetic Rubbers.** F. J. Soday, Baton Rouge, La., assignor to United Gas Improvement Co., a corporation of Pa.

2,471,818. **Synthetic Resin from an Alpha-Beta-Unsaturated Dicarboxylic Acid, a Vinylidene Compound and Divinylbenzene.** M. J. Hunter and W. C. Bauman, assignors to Dow Chemical Co., all of Midland, Mich.

2,471,866. **Reclaiming a Rubbery Copolymer of Isobutylene and a Polyolefin by Heating in the Presence of a Tertiary Aliphatic Mercaptan.** L. T. Eby, Roselle, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,471,870. **Oil-Resistant Composition Including Butadiene-Acrylonitrile Copolymer, a Vinyl Resin, Zinc Oxide, Sulfur, Tricresyl Phosphate, Accelerator, Filler, and Antioxidant.** P. T. Gidley, Fairhaven, Mass., assignor, by mesne assignments, to Standard Oil Development Co., a corporation of Del.

2,471,887. **Composition Including a Copolymer of Isobutylene with a Multiolefin Having 4 to 6 Carbon Atoms per Molecule together with a Polyalkylated Monophenol.** J. F. Nelson, Elizabeth, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,471,890. **Polymerization of a Mixture of Tertiary Olefin and Alkyl Halide Chilled to a Temperature between —50° and —175° F., Which Includes Admixing a Chilled Solution of an Aluminum Halide in an Alkyl Halide to Which Hydrogen Halide Has Been Added.** F. A. Palmer, Wooster, Tex., assignor, by mesne assignments, to Standard Oil Development Co., Elizabeth, N. J.

2,471,927. **Preparation of Methacrylonitrile.** N. M. Bortnick, Philadelphia, and D. J. Butterbaugh, Abington, assignors to Rohm & Haas Co., Philadelphia, both in Pa.

2,471,928. **Preparation of Methacrylonitrile.** N. M. Bortnick and G. W. Cannon, assignors to Rohm & Haas Co., all of Philadelphia, Pa.

2,471,938. **In the Emulsion Polymerization of Conjugated Diolefins, Pretreatment with Ferrous Sulfate before Adding an Oxidizing-Type Polymerization Catalyst.** W. W. Crouch and J. E. Pritchard, both of Bartlesville, Okla., assignors to Phillips Petroleum Co., a corporation of Del.

2,471,945. **As Wetting Agent, a Blend of Water-Soluble Surface-Active Agent and a Polyethyleneglycol Diester.** H. G. Figdor, assignor to E. F. Houghton & Co., both of Philadelphia, Pa.

2,471,959. **Polymerizing Ethylenically Unsaturated Monomers in the Presence of a Catalytic Amount of an Organic Azo Compound.** M. Hunt, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,472,054. **In the Manufacture of Sponge Rubber Articles, the Addition of a Delayed Coagulant from the Class of Fluotitanates to Control the Time for Gelation.** G. H. McFadden, assignor to Ohio State University Research Foundation, both of Columbus, O.

2,472,055. **In the Manufacture of Sponge Rubber Articles, the Addition of a Delayed Coagulant Consisting of Ammonium Fluozirconate.** G. H. McFadden and J. F. Lyman, both of Columbus, O., and A. G. Horney, Merrifield, Va., assignors to Ohio State University Research Foundation, Columbus.

2,472,085-086. **Carburetor Process for Making N-Vinyl Compounds.** H. Beller, Cranford, and R. E. Christ and F. Wuerth, both of Elizabeth, both in N. J., assignors to General Aniline & Film Corp., New York, N. Y.

2,472,112. **Flameproof Coating Composition Including Chlorinated Paraffin Wax or Chlorinated Rubber and an N-Chloro Compound.** M. Leatherman, United States Army.

2,472,232. **Emulsion Polymerization of Butadiene in the Presence of a Gylcol Monoether.** W. A. Schulze and W. W. Crouch, both of Bartlesville, Okla., assignors to Phillips Petroleum Co., a corporation of Del.

2,472,434. **Preparing Vinyl Esters by Reacting a Vinyl Haloformate with a Salt of a Polycarboxylic Acid.** A. Pechuka, Akron, O., assignor to Pittsburgh Plate Glass Co., Allegheny County, Pa.

2,472,487. **Butadiene Extraction.** J. B. Lovell, Baton Rouge, La., assignor to Standard Oil Development Co., a corporation of Del.

2,472,495. **Condensation Product of a Polyhalogenated Aliphatic Hydrocarbon and a Copolymer of a Cyclic Compound and an Unsaturated Aliphatic Hydrocarbon.** W. J. Sparks, Cranford, and D. W. Young, Roselle, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,472,589. **Polymerization of Alpha Alkyl Styrenes.** A. B. Hersberger, Drexel Hill, assignor to Atlantic Refining Co., Philadelphia, both in Pa.

2,472,629. **Preparation of Dimethyl Silicone Gums.** M. M. Sprung, Scotia, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,472,661. **Resinous Interpolymers Prepared by Heating Dimethallyl Maleate, a Diester Resulting from the Esterification of Methallyl Alcohol with a Dibasic Acid, and Styrene.** R. E. Holmen, Ann Arbor, Mich., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,472,672. **Vinyl Sulfone-Diene Interpolymers.** C. J. Mighton, Christiana Hundred, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,472,680. **Coating Compositions Employing Polyethylene Coated Pigments.** B. C. Pratt, Brandywine Hundred, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,472,799. **Alkali-Metal Salts of Triorganosilanols.** J. F. Hyde, assignor to Corning Glass Works, both of Corning, N. Y.

2,472,811-812. **Esters of Alpha-Fluoromethyl Acrylic Acids and Polymers of the Esters.** J. B. Dickey, assignor to Eastman Kodak Co., both of Rochester, N. Y.

2,472,900. **Vinyl Chloride Resins Plasticized with Diester Amides.** F. Johnston and W. H. Hensley, both of St. Albans, W. Va., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,472,901. **The Diester-Amide of Diethanolamine and 2-Ethylhexanoic Acid as Plasticizer for Vinyl Chloride Resins.** F. Johnston and W. H. Hensley, both of St. Albans, W. Va., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,472,946. **Trichloroacetyl Chloride.** E. J. Hart, Cedar Grove, and M. S. Mathewson, Clifton, both in N. J., assignors to United States Rubber Co., New York, N. Y.

2,472,963. **In a Metal Building Sheet Having a Fibrous Covering, a Bonding and Outer Protective Coating Including the Resinous Reaction Product of a Member from the Group of Allyl, Vinyl and Acrylic Monomers, with a Polyester Resin.** F. G. Singleton and P. W. Jenkins, assignors to H. H. Robertson Co., all of Pittsburgh, Pa.

2,473,005. **Polymerizing a Vinyl Halide in the Presence of an Aqueous Inert Ionizing Solvent and an Acidic Complex Polymerization Catalyst.** J. W. Britton and R. C. Dosser, assignors to Dow Chemical Co., all of Midland, Mich.

2,473,016. **Reducing the Cut-Growth Rate of Vulcanized Butadiene-Styrene Copolymer by Adding Oxide of Calcium or Magnesium before Vulcanization.** A. R. Davis, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,473,030. **Composition Including a Copolymer of Vinyl Acetate and Vinyl Chloride, Plasticizer, Clay, and Ground Peanut Hulls.** H. M. Kulman, assignor to Kulastic Co., Inc., both of Atlanta, Ga.

2,473,124. **Production of a Polymer of a Beta, Gamma-Monoolefinic Monohydric Alcohol.** D. E. Adelson, Berkeley, and T. W. Evans, Oakland, assignors to Shell Development Co., San Francisco, all in Calif.

2,473,319. **Gasket Composition Including Butadiene-Acrylonitrile Copolymer, Liquid Petroleum Oil, Graphite, Thermosetting Phenol-Formaldehyde Resin, and Sulfur.** H. A. Winkelmann, assignor to Dryden Rubber Co., both of Chicago, Ill.

2,473,390. **Butadiene Emulsion Polymerization Process, Including Mercaptan and Cyanide Modifiers.** H. J. Rose and M. K. Rowan, both of Baton Rouge, La., assignors to Standard Oil Development Co., a corporation of Del.

2,473,486. **Producing 1-Cyanobutadiene-1,3 by Acylating a Difficultly Separable Mixture Including 1-Cyanobutadiene-1,3 and 1-Cyano-3-Butene-2-ol and Pyrolyzing the Acylated Mixture.** P. H. Wise, Rocky River, assignor to Wingfoot Corp., Akron, both in O.

2,473,498. **Synthetic Resins Derived from Acylonitrile Adducts.** J. R. Dudley, Cos Cob, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,473,538. **Liquid Styrene-Butadiene Interpolymers.** O. R. McIntire, assignor to Dow Chemical Co., both of Midland, Mich.

2,473,548. **Polymerization of Vinylidene Compounds in Aqueous Emulsion in the Presence of Ionizable Silver Compounds and Ammonia.** G. W. Smith, Grand Forks, N. D., assignor to the B. F. Goodrich Co., New York, N. Y.

2,473,549. **Polymerizing Vinylidene Compounds in Aqueous Medium in the Presence of Silver Ion and Oxalate Ion.** G. W. Smith, Grand Forks, N. D., assignor to the B. F. Goodrich Co., New York, N. Y.

2,473,606. **Compounding Rosin, Rosin Oil and Polyisobutylene.** H. N. Padowicz, Livingston, N. J., assignor to Western Electric Co., Inc., New York, N. Y.

2,473,708. **Polymerization Product Free from Crazing on Long Standing Obtained from Styrene by Adding the Sodium Salt of Dioctyl Sulfo-Succinate and Heating.** R. F. Hayes, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,473,801. **Aqueous Emulsion Containing Polymerizable Monomeric Polyallyl Ester of a Polybasic Acid and a Maleic Polyester of Hexaethylene Glycol.** E. L. Kropa, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,473,924. **Obtaining Synthetic Linear Polyamides in Which Crystallization Is Retarded.** I. F. Walker, Hockessin, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,473,929. **Polymerization Process.** W. K. Wilson, assignor to Shawinigan Resins Corp., both of Springfield, Mass.

2,473,996. **A Polymer of Ethylene and a Vinyl Ester of a Carboxylic Acid.** W. E. Hanford, Easton, Pa., and J. R. Roland and W. E. Mochel, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,474,010. **Plasticizer Including the Mixed Ester of an Aliphatic Dihydric Alcohol with a Fatty Acid and a Carboxylic Aliphatic Nitrile.** L. D. Myers and J. D. Fitzpatrick, assignors to Emery Industries, Inc., all of Cincinnati, O.

2,474,087. **Preparation of Silicon Halides.** A. J. Parry and J. W. Gilkey, both of Midland, and L. De Pree, Holland, both in Mich., assignors to Dow Chemical Co., Midland.

2,474,095. **Polyvinyl Ketals.** W. R. Cornthwaite and N. W. Flodin, both of Niagara Falls, N. Y., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,474,175. **Carrying Out Condensation Reactions.** C. Weizmann, assignor to Polymerizable Products, Ltd., both of London, England.

2,474,206. **Production of Vinyl Chloride by Pyrolysis of Ethylene Dichloride.** W. L. J. de Nie, Amsterdam, Netherlands, assignor to Shell Development Co., San Francisco, Calif.

2,474,309. **Sunlight Resistant Composition Including Butadiene-Acrylonitrile Copolymer, Resinous Polymer of Vinyl Acetate, Carbon Black, Dioctyl Phthalate, Tricresyl Phosphate, Dibenzyl Sebacate, Zinc Oxide, Sulfur, Benzothiazyl Disulfide, Phenyl Beta Naphthylamine, Paraffin Wax and Stearic Acid.** P. T. Gidley, Fairhaven, Mass., assignor, by mesne assignments, to Standard Oil Development Co., a corporation of Del.

2,474,350. **Polysulfone Resin Plasticized with the Ester of Cresol and Benzyl Sulfonic Acid.** G. E. Eilermane, Milwaukee, Wis., assignor to Pittsburgh Plate Glass Co., Allegheny County, Pa.

2,474,444. **Preparation of Alkyl-Substituted Silicon Compounds.** A. G. Taylor, Birmingham, England, assignor to Dow Corning Corp., Midland, Mich.

2,474,571. **Low-Temperature Polymerization of Isobutylene.** P. W. Brakeley, Jr., Plainfield, and D. W. Young, Roselle, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,474,578. **Methyldichloromethyldichlorosilane.** W. F. Gilliam, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,474,589. **Substituted 3-Carbamyl-2-Piperidones.** G. H. Morey, Terre Haute, assignor to Commercial Solvents Corp., County of Vigo, both in Ind.

2,474,592. **Polymerization of Isobutylene with a Diolefin.** F. A. Palmer, Wooster, Tex., assignor to Standard Oil Development Co., a corporation of Del.

2,474,612. **Copolymers of Vinyl Isocoumarans with Ethylenically Unsaturated Compounds.** A. L. Barney, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,474,613. **Copolymers of Vinyl Isocoumarans with Styrenes.** A. L. Barney, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,474,614. **Copolymers of Vinyl Isocoumarans with 1,3-Dienes.** A. L. Barney, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,474,670. **Propylene Polymers.** A. B. Hersberger, Drexel Hill, and R. G. Heiligmann, Yeadon, assignors to Atlantic Refining Co., Philadelphia, all in Pa.

2,474,671. **Polymerization of Olefinic Hydrocarbons with Friedel-Crafts Catalysts.** A. B Hersberger, Drexel Hill, assignor to Atlantic Refining Co., Philadelphia, both in Pa.

2,474,776. **Copolymer of Butadiene-Acryloni-**

trile Plasticized with Hexanebisdibutylamide. A. W. Campbell, assignor to Commercial Solvents Corp., both of Terre Haute, Ind.

2,474,777. **Chloropyrenes.** P. G. Carter, Manchester, England, assignor to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,474,793. **Butadiene Polymers and Copolymers Plasticized with 2-Acetamido-2-Methyl-1,3-Propanediol Diacetate.** P. F. Tryon, assignor to Commercial Solvents Corp., both of Terre Haute, Ind.

Dominion of Canada

456,307. **Preparation of Melamine Resin.** P. C. Schroy, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,308. **Preparation of Aqueous Dispersions of Synthetic Resins.** D. W. Light, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., U. S. A.

456,309. **Water-Soluble Melamine-Formaldehyde Resin.** H. J. West, Stamford, and W. T. Watt, Cos Cob, both in Conn., assignors to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,311. **Copolymer of Isopropenyl Toluene and Acrylate.** E. L. Kropa, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,313. **Addition Product of Acrylonitrile and Alloocimene or Myrcene.** A. A. Miller and T. F. Bradley, both of Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,314. **Vulcanizing Rubbers in the Presence of Sulfur and a Reaction Product of Cyanamide, Formaldehyde, and Mercaptothiazoline.** A. R. Davis, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y.

456,315. **Polymerizing a Mixture Including an Unsaturated Alkyd Resin, Styrene, and an Organic Peroxide in the Presence of a Ferrous Salt.** R. R. Harris, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,316. **Polymerizing a Mixture Including an Unsaturated Alkyd Resin, Styrene, and an Organic Peroxide in the Presence of a Stannous Salt.** R. R. Harris, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,317. **Resinous Reaction Product of Formaldehyde, Melamine and a Mono-Amine Having Two Aromatic Nuclei.** R. Lindenfelser, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,329. **Production of Polystyrene Which Includes Continuously Agitating an Aqueous Dispersion of Monomeric Styrene in the Presence of a Water Soluble Salt of an Oxy-Acid of Sulfur, Free Oxygen, and a Water-Soluble Metal Salt.** B. T. D. Sully, Ewell, assignor to A. Boake, Roberts & Co., Ltd., London, both in England.

456,408. **Polymerizable Nuclear Trichlorostyrene.** J. C. Michalek, Niagara Falls, assignor to Mathieson Alkali Works, New York, both in N. Y., U.S.A.

456,445. **Acrylonitrile.** LeR. U. Spence, Elkins Park, and J. C. Mitchell, assignors to Rohm & Haas Co., both of Philadelphia, both in Pa., U.S.A.

456,457. **Thermally Stable and Corrosion Inhibiting Coating for Metals Including a Chlorine-Containing Thermoplastic Resin, and a Substance from the Group of Methyl, Ethyl, Propyl and Butyl Monoesters of Phosphoric Acid, in a Solvent Mixture.** F. R. Stoner, Jr., Edgeworth, and G. W. Seagren, assignor to Stoner-Mudge, Inc., both of Pittsburgh, both in Pa., U.S.A.

456,514. **Chloroacetonitrile.** I. Hechenbleikner, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,537. **Polymerizing an Assymetrical Chloro Substituted Ethylene.** H. P. Staudinger, Ewell, and M. D. Cooke, Banstead, both in England, assignors to Distillers Co., Ltd., Edinburgh, Scotland.

456,548. **In Safety Glass, a Sheet of Polymerized Incomplete Vinyl Acetol Resin Obtained by Reacting Vinyl Alcohol with Butyraldehyde and Plasticized with Triethylene Glyco Dioctoate.** B. J. Dennison, Aspinwall, Pa., U.S.A., assignor to Duplate Canada, Ltd., Oshawa, Ont.

456,572. **Vulcanizing Vinyl Resins by Incorporating a Condensation Product of Butyraldehyde and Aniline, and a Polyhydroxy Benzene.** L. F. Reuter, III, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

456,596. **Material Opaque to X-Rays, Including Polymerized Methyl Methacrylate in Which Is Incorporated Ethylene Dibromide.** S. A. Leader and J. J. Gordon, assignors to Portland Plastics Ltd., all of London, England.

456,598. **Solid Extrudable Composition Including Polyvinyl Alcohol, Polyhydric Alcohol Plasticizer, and Phthalic Anhyride.** C. Danglemajor, Nutley, N. J., U.S.A., assignor to Resistoflex Corp., Belleville, N. J., U.S.A.

456,600. **Oxy-Condensation Polymerization of Allyl Alcohol.** H. Dannenberg and D. E. Adelson, both of Berkeley, assignors to Shell Development Co., San Francisco, both in Calif., U.S.A.

456,624. **1, 2-Propylene-2-Cyano-3-Carboxylates.** C. R. Milone, Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

456,625. **Color Stabilization of Vinyl Halide Resins.** F. W. Cox, Cuyahoga Falls, and J. M. Wallace, assignors to Wingfoot Corp., both of Akron, both in O., U.S.A.

456,626. **Vinylidene-Allyl Carballoxy Aryl Carbonate Interpolymer.** G. R. Milone, Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

456,627. **Vinyl Chloride Interpolymerized with the Di(Chlorallyl) Ester of Beta, Beta' Dicarboxy Diethyl Ether.** C. R. Milone, Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

456,628. **Regnerating a Vulcanized Copolymer of a Diene and Styrene by Heating under Pressure with Coal-Tar Distillate.** T. A. Johnson, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

456,629. **Regenerating Vulcanized Copolymers of Isobutylene and Butadiene-1,3 by Heating under Pressure with Coal-Tar Distillate.** T. A. Johnson and H. H. Thompson, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

456,644. **Stabilized Aqueous Rubber Dispersion Including an Alkaline Aqueous Rubber Dispersion Containing Zinc Oxide and a Condensation Product of Ethylene Oxide and a Hydroxyl Compound.** M. R. Buffington, Milburn, N. J., U.S.A.

456,692. **Polymerizable Composition Including Styrene and a Resin.** E. L. Kropa, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,693. **Polymerizable Mixture Including an Aryl Vinyl Compound and a Modified Unsaturated Alkyd Resin.** E. L. Kropa, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,694. **Vulcanizing Rubber with Diaryl Guanidine Addition Products.** A. R. Davis, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,696. **Polymerizing a Vinyl Ester in an Aqueous Solution of a Zinc Salt.** E. L. Kropa, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

456,718. **Methyl Polysiloxane Resin.** K. N. Mathes and B. A. Blatz, Schenectady, N. Y., U.S.A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

456,719. **Polysiloxane Electrical Insulating Compositions.** P. O. Nicodemus, York, Pa., U.S.A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

456,720. **Preparation of a Cellular Phenolic Resin.** J. D. Nelson and P. V. Steenstrup, both of Pittsburgh, Pa., U.S.A., assignors to Canadian General Electric Co., Ltd., Toronto, Ont.

456,732. **As Bond for Laminated Plate Glass, a Layer of Synthetic Thermoplastic Material Modified by Incorporation of the Ester Produced from Tri Ethylene Glycol and a Mixture of Free Acids Derived from Coconut Oil.** B. J. Dennison, Aspinwall, Pa., U.S.A., assignor to Duplate Canada, Ltd., Oshawa, Ont.

456,745. **Poly-N-Vinyl Pyrrole Compounds.** W. Freudenberg, Cranford, N. J., assignor to General Aniline & Film Corp., New York, N. Y., both in the U.S.A.

456,750. **Triethanolamine as Softener for Butadiene-Styrene Copolymers.** D. V. Sarbach, Cuyahoga Falls, O., assignor to B. F. Goodrich, Co., New York, N. Y., both in the U.S.A.

456,759. **Inhibiting Polymerization of Nuclear Chlorostyrenes by Incorporating a Nitroso-Phenol.** E. R. Erickson, Oak Park, Ill., assignor to Mathieson Alkali Works, New York, N. Y., both in the U.S.A.

456,760. **Retarding Dehydrochlorination of Halogenated Organic Compounds by Incorporating a Nitroso-Phenol of Nitroso-Aromatic Amine.** E. R. Erickson, Oak Park, Ill., assignor to Mathieson Alkali Works, New York, N. Y., both in the U.S.A.

456,798. **Devulcanizing Rubber by Heating under Pressure with Oxygen- and Nitrogen-Free Organic Disulfide Devulcanizing Agent of over Eight Carbon Atoms.** J. C. Elgin, Princeton, N. J., assignor to U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y., both in the U.S.A.

456,841. **In the Manufacture of a Friction Element for Vehicular Brakes, a Bonding Agent Which Is the Heat Reaction Product of a Mixture of Phenol-Aldehyde Resin, a Heat-Polymerizable Drying Oil or Natural Rubber, and Sulfur, and Which has Dispersed Therethrough Resilient Particles of Butadiene-Acrylonitrile Copolymer.** R. E. Spokes, Ann Arbor, and E. C. Keller, Detroit, both in Mich., assignors to American Brake Shoe Co., New York, N. Y., U. S. A.

456,846. **Electrically Conducting Elastomer Compound Containing Carbon Black in a Form Giving Maximum Resistivity of 500 Ohms per Cubic Inch after Initial Milling, and Also Containing a Material of the Class of Anhydrous Wool Grease, Palm Oil and Related Fatty Acid Glycerides.** M. Newman, Worcester, Mass., assignor to American Steel & Wire Co. of N. J., Cleveland, O., both in the U. S. A.

456,871. **Organo-Dihalogenosiloxane.** W. I. Patnode, Schenectady, N. Y., U. S. A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

456,872. **Hydrolyzing Dimethyldihalogenosilanes.** J. G. E. Wright, Schenectady, N. Y., U. S. A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

456,874. **Resinous Material Prepared from a Polymer of Alpha-Chloracrylic Acid.** W. O. Kenyon and L. M. Minsk, Rochester, N. Y., U. S. A., assignors to Canadian Kodak Co., Ltd., Toronto, Ont.

456,898. **Wrapping Tissue Including a Base Sheet of Hydrophilic Hydroxylated Organic Polymer, a Coating of a Vinylidene Chloride Copolymer and an Intermediate Anchoring Medium Including a Compound of the Werner Type.** A. D. McLaren, Brooklyn, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U. S. A.

456,911. **Mixing an Organic Diisocyanate Modified Unsaturated Polymer from the Group of Polyesters and Polyesteramides with Sulfur and an Accelerator, and Heating to Effect Vulcanization.** J. G. Cook, D. A. Harper, R. J. W. Reynolds, and W. F. Smith, Blackley, England, assignors to Canadian Industries, Ltd., P. Q., assignor to Imperial Chemical Industries, Ltd., London, England.

456,926. **Styrene Fractionation.** T. A. Gadwa, Mt. Vernon, assignor to the Lummus Co., New York, both in N. Y., U. S. A.

456,930. **Elastic Rubber-Like Material Produced by Milling together the Copolymer of 95 Parts of Methyl Acrylate and 5 Parts Maleic Anhydride with Ethylene Glycol, Molding, and Heating.** F. C. Atwood, Newtonville, Mass., assignor to National Dairy Products Corp., New York, N. Y., both in the U. S. A.

456,931. **Forming Polymers of Alkyl Acrylates.** F. C. Atwood, Newtonville, Mass., assignor to National Dairy Products Corp., New York, N. Y., both in the U. S. A.

456,960. **Rubber-to-Metal Adhesive Composition Including an Admixture of a Potentially Reactive Resinous Reaction Product of a Mixture of Cashew Nut Shell Oil and Another Phenol, with Solubilized Depolymerized Vulcanized Rubber and a Hardening Agent for the Resin.** C. F. Brown, Nutley, and G. E. Hulse, Jr., Passaic, both in N. J., assignor to United States Rubber Co., New York, N. Y., both in the U. S. A.

457,032. **Oxidized or Depolymerized Rubber Derivatives from Reclaimed Rubber.** F. J. W. Popham, New Barnet, assignor to British Rubber Producers' Research Association, London, both in England.

457,038. **Cyclopentadiene and Its Homologs.** C. E. Staff, Charleston, W. Va., U. S. A., assignor to Carbide & Carbon Chemicals, Ltd., Toronto, Ont.

457,044. **Reacting an Organo-Lithium Compound with Ethyl Orthosilicate.** R. F. Fleming Jr., Laurens, S. C., assignor to Corning Glass Works, Corning, N. Y., both in the U. S. A.

457,049. **Accelerating the Oil Phase Interpolymerization of Unsaturated Alkyd Resins with Monoenic Compounds by Means of a Sulph-Hydryl Compound.** C. F. Fisk, Clifton, N. J., U. S. A., assignor to Dominion Rubber Co., Ltd., Montreal, P. Q.

457,050. **Liquid Composition Including a Polysilicic Acid Partially Esterified with a Monohydric Alcohol.** J. S. Kirk, Cleveland, O., U. S. A., assignor to Canadian Industries Ltd., Montreal, P. Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U. S. A.

457,075. **Plasticized Oil-Free Phenol-Formaldehyde Resin.** C. H. Hempel, assignor to Herisite & Chemical Co., both of Manitowoc, Wis., U. S. A.

457,077-078. **Organic Silicon Compounds.** P. J. Garner, Northwich, assignor to Imperial Chemical Industries, Ltd., London, England.

457,128. **Polymer of an Acetal of a Beta, Gamma Olefinic Alcohol.** D. E. Adelson and H. F. Gray, Jr., both of Berkeley, assignors to Shell Development Co., San Francisco, both in Calif., U. S. A.

457,146. **Compounding Butadiene-Styrene Copolymer Latex.** W. McMahon, Summit, N.

J., assignor to Bell Telephone Laboratories, Inc., assignor to Western Electric Co., Inc., both of New York, N. Y., both in the U. S. A.

457,208. **Making Polystyrene with a Distribution of Polymer Components Suitable for Molding.** I. Allen, Jr., Bloomfield, N. J., U. S. A., assignor to Bakelite Corp. of Canada, Ltd., assignor to Carbide & Carbon Chemicals, Ltd. assignor to Bakelite Co. (Canada), Ltd., all of Toronto, Ont.

457,221. **Resinous Copolymer of a Mixture of Liquid Methyl Vinyl Polysiloxane and Methyl Methacrylate.** G. F. Roedel, Schenectady, N. Y., U. S. A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

457,222. **Preparation of N-Vinyl Carbazole.** H. F. Miller and R. G. Flowers, both of Pittsfield, Mass., U. S. A., assignors to Canadian General Electric Co., Ltd., Toronto, Ont.

457,234. **Vulcanization of Rubber with N-(Carbamyl) Benzothiazyl Sul.enamide.** W. H. Ebelke, Saranac Lake, N. Y., U. S. A., assignor to Dominion Rubber Co. Ltd., Montreal, P. Q.

457,242. **Adhesive Composition Giving a Temporary Bond on Paper and the Like Including a Solution of a Highly Polymeric Rubber-Like Vinyl Ether of a Lower Aliphatic Alcohol, a Non-Volatile Antioxidant and a Non-Volatile Ester-Type Plasticizer.** A. O. Zoss, Easton, Pa., assignor to General Aniline & Film Corp., New York, N. Y., both in the U. S. A.

457,286. **Contacting 2-Chlorobutene-2 with Activated Alumina and Recovering Butadiene-1,3 and Compound Isomeric therewith.** G. W. Hearne, Berkeley, assignor to Shell Development Co., San Francisco, both in Calif., U. S. A.

457,302. **Copolymer Obtained from Vinyl Chloride, Vinylidene Chloride together with Diallyl Gamma-Acetyl-Gamma-Methylpimelate.** C. R. Milone, Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O., U. S. A.

457,303. **Reclaiming a Vulcanized Diene-Styrene Copolymer by Treating with Alkali and Then Masticating with an Acidic Metal Salt of an Inorganic Acid from the Group of Magnesium, Aluminum and Zinc Salts.** T. A. Johnson and H. H. Thompson, assignors to Wingfoot Corp., all of Akron, O., U. S. A.

457,338. **Methacrylates.** E. L. Kropa, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U. S. A.

457,340. **Styrene-Acrylonitrile Copolymers.** I. Allen, Jr., Bloomfield, N. J., U. S. A., assignor to Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignor to Bakelite Co. (Canada), Ltd., Toronto, Ont.

457,362. **Preparation of Organosilicon Compounds.** H. C. Miller, Claymont, and R. S. Schreiber, Wilmington, both in Del., U. S. A., assignors to Canadian Industries, Ltd., Montreal, P. Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

457,363. **Organic Polyfluoro Compounds.** W. E. Hanford, Easton, Pa., U. S. A., assignor to Canadian Industries, Ltd., Montreal, P. Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U. S. A.

457,364. **Obtaining a Mixture of Tetra-Fluoroethyl Carbonylic Compounds.** W. E. Hanford, Easton, Pa., U. S. A., assignor to Canadian Industries, Ltd., Montreal, P. Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U. S. A.

457,365. **Monomeric Organic Fluorine Compounds.** P. L. Barrick, Wilmington, Del., U. S. A., assignor to Canadian Industries, Ltd., Montreal, P. Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.

457,366. **Polyfluoro 4-Carbon Atom Ring Carboxylic Acids and Derivatives.** P. L. Barrick and R. D. Cramer, both of Wilmington, Del., U. S. A., assignors to Canadian Industries Ltd., Montreal, P. Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

457,367. **Heptafluoromonochlorocyclobutane.** P. L. Barrick, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del., U. S. A.

457,368. **Tetrafluoroethylene - Ethylene Copolymers.** K. L. Berry, Hockessin, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del., U. S. A

457,369. **Composition Including a Dispersion in an Anhydrous Normally Liquid Organic Medium of a Copolymer of Tetrafluoroethylene and Another Polymerizable Monoethylenically Unsaturated Compound.** K. L. Berry, Hockessin, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del., U. S. A.

457,370. **Preparing 1,1-Difluoroethane.** R. E. Burk, D. D. Coffman, and G. H. Kalb, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del., U. S. A.

457,379. **Reacting a Lactone of a Beta-Hydroxy Monocarboxylic Acid with Ammonia to Obtain Amides of a Beta-Hydroxy Monocarboxylic Acid.** F. E. Kung, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U. S. A.

MACHINERY

United States

2,471,683. **Multiple-Nozzle Mechanism for Injection Molding Machines.** E. W. Halbach, Andover, assignor to Bolta Co., Lawrence, both in Mass.

2,471,813-814. **Injection Molding Apparatus.** W. P. Cousino, Detroit, assignor to Chrysler Corp., Highland Park, both in Mich.

2,472,057. **Apparatus to Treat Tire Fabrics.** R. P. Allen, Akron, assignor to Seiberling Rubber Co., Barberton, both in O.

2,472,123. **Tire Making Machine.** C. E. Powers, Natchez, Miss.

2,472,144. **Electric Heater for Softening Thermoplastics.** J. V. Calhoun, Haverford, assignor to Edwin L. Wiegand Co., Pittsburgh, both in Pa.

2,472,145. **Apparatus for Use in Introducing Comminuted Insulating Material Endwise into a Tubular Sheath to Embed a Resister.** C. W. Cappell, Allison Park, assignor to Edwin L. Wiegand Co., Pittsburgh, both in Pa.

2,472,842. **Apparatus for Dry Spinning Vinyl Compounds.** A. F. G. Mouchiroud and J. A. Trillat, both of Lyon, assignors to Societe "Rhodiaceta", Paris, both in France.

2,473,067. **Machine to Apply Rubber Tire Treads to Carcasses.** E. Miller, Jeannette, Pa.

2,473,230. **Extruder.** J. W. Van Riper, Fair Lawn, assignor to John Royle & Sons, Patterson, both in N. J.

2,473,284. **Device to Mold Sealing Rings.** H. J. Knaggs, assignor to the Weatherhead Co., both of Cleveland, O.

2,473,404. **Apparatus for Continuous Lateral Stretching of Film.** F. J. Young, Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O.

2,474,511. **Device for Applying New Tread Material to Tires.** T. P. Bacon, Jr., Oakland, Calif.

2,474,515. **Tire Spreader.** W. J. Cox, Woodruff, Utah.

2,474,517. **Apparatus for Electronically Heating a Tire Carcass.** J. L. Daum, Oakland, and R. A. McCloud and T. P. Bacon, both of San Leandro, both in Calif.

2,474,542. **Vulcanizer Mold for Tires.** R. A. McCloud, San Lorenzo, and J. L. Daum and T. P. Bacon, both of Oakland, both in Calif.

Dominion of Canada

457,209. **Machine for Planishing, Laminating, or Embossing Thermoplastic Resinous Materials.** H. A. Swallow, Plainfield, N. J., U.S.A., assignor to Carbide & Carbon Chemicals, Ltd., assignor to Bakelite Co. (Canada), Ltd., both in Toronto, Ont.

United Kingdom

622,914. **Apparatus for the Depolymerization of Natural or Synthetic Rubber and the Regeneration of Vulcanized Rubber.** Soc. Electro-Cable and A. Lemercier.

622,936. **Machine for Molding Soles or Soles and Heels on to Shoe Uppers.** W. H. Doherty.

623,094. **Feed Scrolls for Extruders.** Redfern's Rubber Works, Ltd., and F. E. Brown.

623,198. **Apparatus for the Continuous Vulcanization of Rubber-Insulated Electrical Conductors.** V. and G. V. Planer.

623,330. **Apparatus for Covering Wire Conductors.** United States Rubber Co.

623,920. **Curing Bag Splicing Machine.** United States Rubber Co.

UNCLASSIFIED

United States

2,471,554. **Process to Improve the Tensile Strength of Gray Cotton Yarn.** L. Azford, Clifton, N. J., assignor to United States Rubber Co., New York, N. Y.

2,471,642. **Wheel Supporting Stand for Tire Changing.** B. E. Moltz, Gridley, Calif.

2,472,826-828. **Tire Chain Release Device.** M. B. Herbrick, Sterling, Colo.

2,473,092. **Hose Clamp.** D. M. Buffington, Grandfalls, Tex.

2,473,249. **Antiskid Cross Strip.** B. Hershman, Pittsburgh, Pa.

2,473,441. **Hose Coupling.** J. A. Muller, Princeton, assignor to Thermoid Co., Trenton, both in N. J.

2,473,571. **Fluid Pressure-Actuated Tire Mounting or Demounting Device.** M. M. Cook, Visalia, Calif.

2,473,607. **Fabric for Reinforcing Belting.** S. P. Parker, assignor, by mesne assignments, to Callaway Mills Co., both of La Grange, Ga.

2,473,704. **Hose Connector and Valve.** O. L. Garretson, Roswell, N. Mex., assignor to Phillips Petroleum Co., a corporation of Del.

2,473,912. **Tire Relief Valve.** F. W. Schwinn, Chicago, Ill.

2,474,088. **Striping of Vinyl Resin Coated Wires with Ketone Dye Solutions.** R. J. Brown, Hastings on Hudson, N. Y., assignor to Anaconda Wire & Cable Co., a corporation of Del.

2,474,284. **Tire Guard.** G. L. Smith, Cumberland, Md.

2,474,291. **Antiskid Device.** A. F. Warden, Gary, and L. A. Harry, Crown Point, both in Ind.

2,474,470. **Belt Shifting Mechanism.** M. L. Dodge, Seattle, Wash.

2,474,521. **Tire Chain and Mounting Device therefor.** J. G. Fogarty, Rochester, N. Y.

United Kingdom

621,596. **Device for Filling Large Tires with Liquid.** Dunlop Rubber Co., Ltd., and J. R. Davis.

621,741. **Apparatus for Recovering Water-Soluble Metallic Salts in Waste Plant Effluents or Spent Process Liquors.** Firestone Tire & Rubber Co.

621,754. **Insecticides.** United States Rubber Co.

622,361-362. **Tire Protecting and Preserving Devices.** W. C. Carlton.

TRADE MARKS

United States

508,541. **Rally.** Tires, tubes, and repair kits. Whitehall Distributors, Inc. New York, N. Y.

508,543. **Aerfloted.** Carbon black. J. M. Huber Corp., New York, N. Y.

508,556. **Pliogrip.** Cement. Goodyear Tire & Rubber Co., Akron, O.

508,558. **"Toytime."** Balloons. Ashland Rubber Products Corp., Ashland, O.

508,560. **Bullet.** Golf balls. A. G. Spalding & Bros., Inc., Chicopee, Mass.

508,561. **Airborne.** Tires. United States Rubber Co., New York, N. Y.

508,569. **Hercules.** Tires and tubes. Sears, Roebuck & Co., Chicago, Ill.

508,578. **Cordet.** Gasket sheet packing and material. McCord Corp., Detroit, Mich.

508,583. **Tires.** Pharis Tire & Rubber Co., Newark, O.

508,587. **Chemway.** Brake lining and clutch facing adhesives. Southern Friction Materials Co., Charlotte, N. C.

508,588. **Southern.** Brake lining and clutch facing adhesives. Southern Friction Materials Co., Charlotte N. C.

508,591. **Klozure.** Packings. Garlock Packing Co., Palmyra, N. Y.

508,595. **Sur-Spare.** Hose. Randall Products Co., Berkeley, Mich.

508,596. Representation of a globe containing the letter: **"A"** and the word: **"Atlas."** Tube patch units. Atlas Supply Co., Newark, N. J.

508,597. Representation of a geometric figure cut by the word: **"Homart."** Washers. Sears, Roebuck & Co., Chicago, Ill.

508,599. Representation of a circle containing the words: **"Beaver Belting,"** and an inner circle containing representation of the animal. Belting. Chas. A. Schieren Co., New York, N. Y.

508,605. Representation of a triangle containing a fanciful design and the word: **"Durabla."** Gaskets. Durable Mfg. Co., New York, N. Y.

508,607. **Orange Core.** Tape. Hudson Pulp & Paper Corp., Portland, Me.

508,611. Representation of a traffic light. Tires and tubes. Richmond Rubber, Inc., Richmond, Va.

508,619. **Protex.** Zinc oxide. New Jersey Zinc Co., New York N. Y.

508,622. **Santocure.** Accelerator. Monsanto Chemical Co., St. Louis, Mo.

508,636. **Pharis.** Tires and tubes. Pharis Tire & Rubber Co., Newark, O.

508,714 **Resoweld.** Thermoplastic resinous solutions. Goodyear Tire & Rubber Co., Akron, O.

508,721. **Inland.** Cements and vulcanizing gums. Inland Rubber Corp., Chicago, Ill.

508,722. Representation of an oval containing the word: **"Inland."** Cements and vulcanizing gums. Inland Rubber Corp., Chicago, Ill.

(Continued on page 642)

New Machines and Appliances

Laboratory Balance

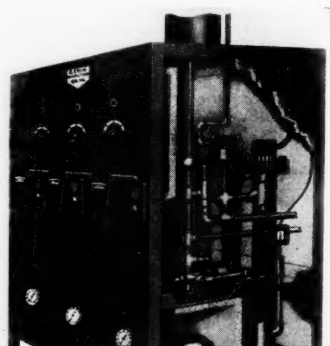
New Laboratory Torsion Balance

A NEW torsion-principle balance for general laboratory use, having a sensitivity rating of two milligrams and a capacity of 120 grams, has been announced by Torsion Balance Co., Clifton, N. J. Other than adherence to the basic beam balancing principle, the new product has undergone a complete reengineering and modernization of design.

The metal case has heavy hard surface fired glass panels set in rubber gaskets. Dust has been excluded to a notable degree; the joints between glass and metal are gasket sealed; openings through the case are fewer and of closer fit to parts passing through them, and raised grommets around the balance pan support allow dusting without particles falling inside. The torsion bands are of an alloy that is said virtually to eliminate corrosion. The balance beam parts and every other exposed metal part are corrosion resistant. Other features of the balance include new and larger pans of polished stainless steel; a larger beam graduated in two parallel scales, one in grams and the other in grains, in different colors; a single balance pointer moving across an index scale positioned for easy reading; a rider designed to stay set unless the balance is subjected to considerable movement; and the fact that no weights below 15 grains (one gram) are needed; the rider is sufficient for everything below this mark.

The hinged lid is dusttight. Exterior finish is in gray and is corrosion resistant; while the interior is a low-gloss white to minimize reflections. The balance is $11\frac{1}{2}$ inches long, six inches deep, and $6\frac{5}{8}$ inches high in overall dimensions.

Heat Transfer System



Gerin Electric Heat Transfer Oil System

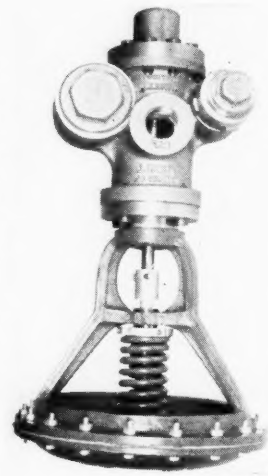
A NEW electric heat transfer system with a number of unusual features and capable of operating at 600° F. has been developed by Gerin Mfg. Co., Inc., Newark, N. J. An exclusive vapor release trap continuously removes vapors formed as the oil passes over the heated surface, thus assuring that the entire heat surface will be oil covered at all times. The trap also eliminates any water present in the oil and any air entrained during filling. Unlike the conventional fin-tube heater, the unit uses a large number of relatively small-height fins, giving more effective heating area of low-watt density with a high-velocity oil flow.

Other features include even delivery and distribution of oil from the pump to the

lower part of the heater, giving even flow past all fins, and reducing vaporization and spot overheating. An expansion tank arrangement prevents contact of hot oil with air and lengthens oil life. Safety features include dual-temperature controls and heat shut-off at low pump pressure. The unit is suitable for use in the processing of chemicals, plastics, rubber, and many other materials.

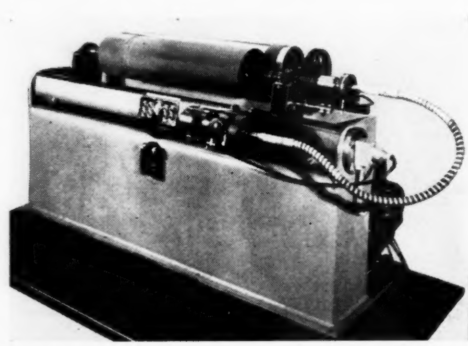
High-Pressure Valves

A COMPLETE line of diaphragm-actuated two-pressure Merit valves is now available for a wide range of applications in high-pressure hydraulic service. Made by Emmett Machine & Mfg., Inc., Akron, O., the valves range in size from one inch to four inches and can be furnished for operation on systems having pressures of 3,000, 5,000, and 10,000 p.s.i.



Merit Hydraulic Valve

The valves provide for shockless operation, rapid servicing, minimum frictional loss, and ready accessibility to all working parts. Variations of valve assembly provide for (1) diaphragm-controlled high-pressure inlet, (2) diaphragm-controlled slow travel valve, or (3) diaphragm-controlled stop valve, all handled within one casting and with minimum pipe connections. Other design features include interchangeability of seats and disks between main valve and check valve assembly and virtual elimination of electrolysis by use of heat-treated Monel seats and disks in a bronze valve body.



Integral Roll Grinder for "Out-Machine" Application

Roll Grinder

THE Integral roll grinder, incorporating an entirely new grinding principle, has been announced by Ryman Engineering Co., Ellwood City, Pa. The principle has two applications: the "in-machine" grinder by which large calender rolls are successfully ground without removal of the rolls from the calender; and the "out-machine" for rolls taken out of machines and brought to the grinder.

The grinder uses abrasive belts as the cutting medium and is dynamically balanced when manufactured. No balancing is required in operation, and changes in grades of abrasives are therefore easily made. Rubber, copper, and bi-metallic rolls difficult to grind with wheels can be ground to close tolerances and a fine finish with this new machine, it is claimed. A feature of the machine is the elimination of ways which reduces the problem of alignment to a minimum, permits grinding of heated rolls, and eliminates the need of a massive bed. Another feature is the use of a semi-positive, infinitely variable traverse which adjusts for roll irregularities. Other features of the grinder include complete insensitivity to vibration; extremely simple operation; and the ability to perform crowning or cambering.

Need faster acceleration?

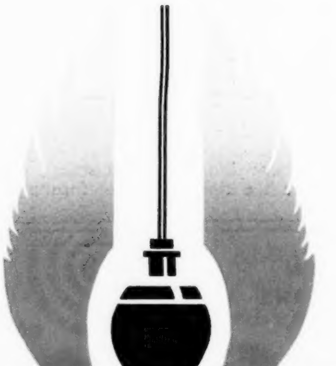
ULTEX*

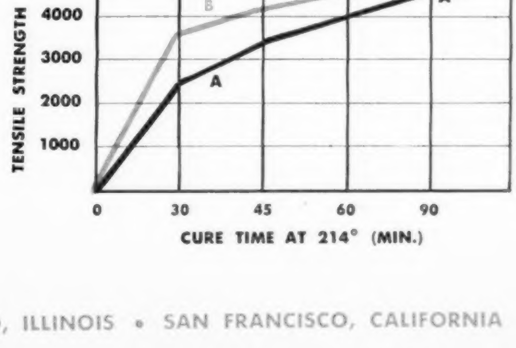
AN ULTRA ACCELERATOR . . .

When looking for fast acceleration consider Ultex, the multiple use accelerator. Rapid and efficient in natural rubber both as a primary and secondary accelerator. Excellent with reclaims and GR-S with safe processing.

TEST RECIPE

COMPOUND	A	B
SMOKED SHEETS	100.0	100.0
ZINC OXIDE	10.0	10.0
SULPHUR	2.0	2.0
STEARIC ACID	1.0	1.0
ULTEX	**0.5**	**0.75**





The **C. P. Hall** *Co.*
CHEMICAL MANUFACTURERS

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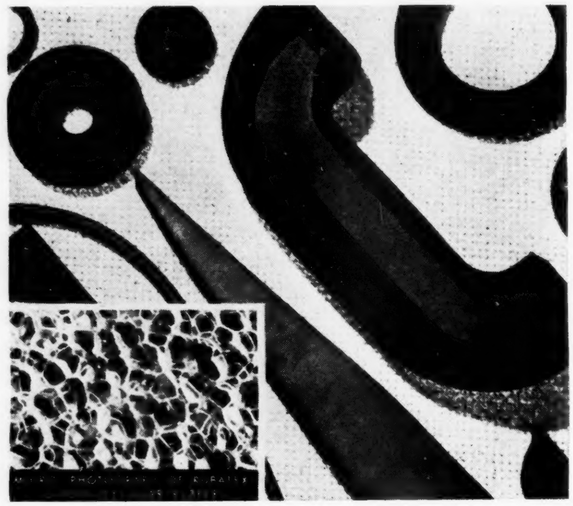
New Goods and Specialties



Rubatex Expanded Rubber Products; Inset Shows Material's Closed Cellular Structure

Rubatex Closed-Cell Expanded Rubber

THE full development and present availability of Rubatex gas-expanded closed-cellular rubber has been announced by Rubatex Division, Great American Industries, Inc., New York 17, N. Y. Unlike sponge rubber in which the air spaces are interconnected, Rubatex is composed of minute cells each individually encased in a wall of rubber, and each filled with inert nitrogen. Because there is no escape of nitrogen or interchange between cells, the product, it is claimed, possesses a very high degree of resilience, thermal non-conductivity, light weight, and buoyancy, together with a moisture absorption of practically zero.

The elasticity of the rubber and the compressibility of the nitrogen result in a product having exceptional ability to absorb shock and recommend it for the protection of the human body in the furnishings of fast-moving vehicles, the facilities of manufacturing plants, and in the clothing and equipment of shock-type sports. Reduction of fatigue by use in shoe soles and seat cushions is another important application; while advantages of the material in the construction of furniture and bedding are

In TUBING, CALENDERING and SPREADING...

New ALBALITH-73

THE SURFACE-TREATED LITHOPONE

EXPEDITES PROCESSING

ALBALITH-73, a special lithopone, rates high as a processing aid. Because its surface is treated with selected fatty acids, this pigment makes for easier mixing, and smoother tubing, calendering and spreading. Thus, Albalith-73 steps up output and improves product quality of black or non-black compounds.

ALBALITH-73 improves processing by lowering viscosity and "nerve" even more than do normal lithopones or Protox-166 Zinc Oxide*— well recognized for those features—as shown by the following data:

	WILLIAMS		MOONEY	
	Plasticity (70°C. @ 3 min)	Recovery (1 min)	Viscosity (ML100°C. @ 3 min)	Recovery (1 min)
Albalith-73	1.94	0.095	39.0	108
Normal Lithopone	2.07	0.11	42.0	128
Protox-166 Zinc Oxide	2.05	0.09	45.5	125

(Values were obtained on stocks 24 hours after mixing.)

In addition, ALBALITH-73 imparts numerous other advantages, such as low water absorption, good electrical properties and high resilience, together with good tensiles and tear resistance.

Add ALBALITH-73 to your compounds to obtain smoother, quicker processing and better quality of products.

**U. S. Patents 2,303,329 and 2,303,330.*

COMPOUND

Smoked Sheet	100
Sulfur	3
Mercaptobenzothiazole	1
Agerite Powder	1
Stearic Acid	3
Lithopone	70.4 – 0
Protox-166 Zinc Oxide	5.0-100

HORSE HEAD PRODUCTS

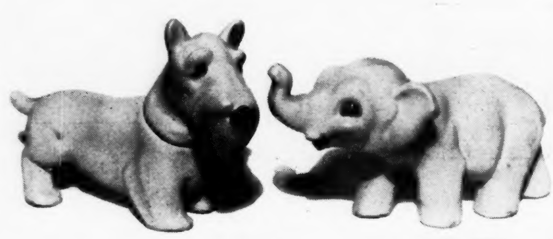
THE NEW JERSEY ZINC COMPANY

Founded 1848

160 FRONT STREET • NEW YORK 7, N. Y.

obvious. Other uses include packing of fragile products, vibration dampening, under-padding for floor coverings, impact fenders, dust barriers, weather stripping, expansion joint fillers, and gaskets. Rubatex's low heat conductance makes it an ideal insulator for refrigeration equipment and cold-weather clothing; while many applications in electrical insulation and marine and aviation equipment are apparent.

Rubatex can be molded in the manufacturer's plant to any desired shape, or may be worked by the fabricator by die-cutting, stamping, splitting, cementing, or other conventional methods. The material is obtainable in sheet form up to one inch thick which can be laminated for greater depth and is offered in either natural or synthetic rubber in a wide range of colors.



Rubber Scottie and Elephant Made by Tillotson

Latex Crib Toys

A NEW series of latex squeezable crib toys has been announced by Tillotson Rubber Co., Inc., Needham Heights, Mass. Available in elephant and Scottie forms, the toys are extremely lifelike and appealing in appearance. Each toy animal is approximately 10 inches in length and is available in pink, blue, and yellow, with only harmless colors used. The toys contain metal whistles and come individually boxed and wrapped in cellophane to insure sanitary condition.

Ruff-Ridge Corrugated Conveyer Belt

Corrugated Conveyer Belt

A NEW type of conveyer belt, molded with a corrugated surface that will raise light goods in cartons or heavy materials in bags up inclines of 30-40 degrees, has been announced by Russell Mfg. Co., Middletown, Conn., through P. F. Madsen, belting division sales manager.

Called Ruff-Ridge, the new belt consists of a solid woven carcass thoroughly impregnated with a neoprene solvent cement for moisture resistance. This carcass is then coated on the upper side with a layer of a neoprene-natural rubber blend 1/8- to 3/16-inch thick. Cured in a special mold, the top surface of the belt is given its corrugations, approximately 3/32-inch deep on 5/16-inch centers. The result is a belt with the chemical and moisture resistance of neoprene and the physical properties of natural rubber. The

(Continued on page 639)

EUROPE

GERMANY

Nomenclature of High Polymer Substances

The question of the nomenclature of high polymer substances has of late been the subject of discussion in the pages of *Kunststoffe* and *Kautschuk und Gummi*. *Kunststoffe* started it all when it published[1] an article by R. Nitsche and H. Heering in which it was suggested that the German term *Kunststoffe* (literally—artificial or synthetic substances) for plastics was too comprehensive and that foreign example be followed and "plastic masses" or "plasts" be substituted, with "polyplasts" indicating high molecular substances. They would divide the latter, according to their chemical composition, into Carboplasts (C-plasts), Carb-oxy-plasts (C-O-plasts), Carb-azo-plasts (C-N-plasts), Carb-thio-plasts (C-S-plasts), and Sil-oxy-plasts (Si-O-plasts).

In a recent issue of *Kautschuk und Gummi*,[2] A. Springer comes forward with a new classification, based on physical properties, specifically the plasticity modulus and the temperature resistance, according to which plastics would be divided into four main groups, those with low modulus and high temperature resistance (type, soft vulcanized rubber), high modulus and high temperature resistance (type, Bakelite), low modulus and low temperature resistance (type, polyisobutylene), and high modulus and low temperature resistance (type, polystyrene, polyvinyl-chloride).

Further sub-division of these four groups might then follow, either in accordance with H. L. Fisher's suggestion or that of Nitsche and Heering.

[1] 38, 173 (1949).
[2] 22, 2, 45 (1949).
[3] India Rubber World, 100, 27 (1939).

Leipzig Spring Fair

The Leipzig Spring Fair, 1949, revealed considerable industrial development as compared with that of the preceding year, and this was noted both in the quality and the variety of goods displayed, which in many cases were said to have reached prewar standards. Of the large number of visitors, roughly 10% came from the Western Zone of Germany and from foreign countries; while the remainder came from the Eastern Zone.

Among the rubber manufacturers represented were several well-known concerns in the Eastern Zone, including: Deka Tire Works, Ketschendorf, and the Gummiwerke Riesa, which showed tires and tubes; the Vulkan Gummiwerke, Leipzig, with toys and surgical and sanitary goods; Primeros, Ortrand, surgical and sanitary goods; "Degufrah," Berlin-Weissensee, belting. The Chemische Werke Buna, Schkopau, had an attractive stand exhibiting its various products and demonstrating by means of photographs and samples the production of synthetic rubber and the by-products obtained in the process. The Elektro-Chemische Kombinat Bitterfeld featured uses of Igelit (polyvinylchloride) for technical purposes, but more particularly for clothing, footwear, ladies' handbags, etc. The Firm of Rost & Co., of Greiz and Hamburg, showed only sheets of its specialty, gutta-syn.

A novelty that attracted attention was an endless rope belt made of long staple Jugoslavian hemp and Buna, exhibited by Thilo Hoffman, Schlotheim, Thuringia. Belting of this type fully replaces endless rubber belts of the V-belt type for many uses and has been successfully employed for more than a year in mining, smelting works, in the chemical industry, and in the workshops of the government railways.

Among the new devices for use in the rubber and plastics industries was a mixing machine, the Elektro-Rekord, of the G.I.E.M.A., Giessereien u. Maschinenbau, Zitau/Sa. Both portable and stationary models were shown; they have round troughs movable about a vertical axis. These mixers are said to be better suited to mixing pulverulent or granular materials than for preparing solutions.

Also demonstrated were machines intended for continuous processes, including a revolving heater for vulcanizing shoes and mechanical rubber goods, put out by the Fa. Industrietechnik, Dresden. This device consists essentially of an annular carrier 2.5 meters in diameter, which turns in an annular channel and is heated by steam. The channel is provided with a door

by which articles mounted on molds are introduced and removed. The machine is driven by a one h.p. electric motor.

The "Rundlaufer" vulcanizing press of the Armaturen & Apparatebau Werke, Halle-Saale, employs the same principle. Here a revolving table is mounted on a vertical column; the lower parts of the molds are secured to the revolving table, while the upper parts run on rolls in an annular slide. The slide has a long straight section and an upwardly curving short section. The former serves to press the molds, and the latter to open and close the press. This press is used for making plastic parts and can be adapted for vulcanizing soles and heels and mechanical rubber goods.

The SAG "Gerat" (L. Schopper, Leipzig) showed a new Schopper tensile tester for work at temperatures of —60° C.

Lignin Resins

Lignin, formerly regarded as a waste product of little value, has become useful as a raw material for the manufacture of plastics, where it has also proved to be a satisfactory substitute for phenol and cresol. The possibility of being able to substitute a large proportion of lignin for phenol is of particular importance to German manufacturers since the occupying powers have restricted the manufacture of steel and with it the operation of coke works, and the production of hydrogenation benzine; these two are among the chief sources for phenol in Germany.

In a recent article K. Kipphan[1] discusses earlier investigations on lignin and its present possibilities. Information on the constitution of lignin is still not quite complete, but it is recalled that, as a result of the investigations of Freudenberg and his coworkers in 1940, it may be said that the basis of lignin consists of aromatic substances, probably phenylpropane derivatives, hydroxylated or methoxylated at the side chain in the para and meta position. These fundamental substances are condensed to macromolecules with a molecular weight of 2,000 to 8,000 in the isolated lignin. Even in its crude, untreated state, lignin can be shaped under heat and pressure, though the products thus obtained are brittle because of the high degree of polymerization of the raw lignin. By dissolving lignin in alkali under pressure and reprecipitating with acid, however, it is depolymerized and rendered more plastic. Unlike the untreated material, reprecipitated lignin is soluble in organic liquids as aniline and pyridine, also partly in alcohol. Chlorination also increases the thermoplasticity and solubility of lignin which binds about 50% of its weight of chlorine.

But much more valuable products are obtainable if lignin is reacted with organic compounds, especially phenols and aromatic amines; aliphatic bodies with hydroxyl or amino groups are also capable of forming with lignin compounds of increased plasticity. The reaction takes place in the presence of small amounts of a mineral acid catalyst.

Lignin-phenol resins closely resemble acid condensed phenol-formaldehyde resins, the so-called Novolaks, and like them are only slightly or not at all hardened by heat. With them, too, the addition of hexamethylenetetramine causes rapid hardening, and phenollignin resin in alkaline solution can also be treated with formaldehyde to yield resoletype products. The lignin resins obtained in this way have satisfactory mechanical properties, and where the dark-brown color of the lignin is no objection, lignin can replace up to 50%, and possibly even up to 70%, of phenol without any perceptible reduction in quality.

[1] *Kunststoffe*, 39, 3, 71 (1949).

Plastics & Rubber Section Meets

On June 2, 1948, a section for Plastics & Rubber was formed within the Society of German Chemists in the British Zone, and on October 19 the Section held its first meeting in Leverkusen, attracting about 200 persons.

The meeting was opened by K. Ziegler, president of the Society of German Chemists in the British Zone. Dr. Hochtlen, who organized the session, acted as chairman and reviewed the founding of the Section and its aims and discussed its proposed collaboration with the bureau of standards for plastics and eventually also with the Association of German Engineers, which has recently been formed again.

Finally a number of papers were read including: "Acceleration of Polymerization of Unsaturated Compounds with the Aid of the Redox System," by W. Kern; "Formation Mechanics and Structure of Butadiene Polymers," K. Ziegler; "Works on the Constitution of Synthetic Rubber," W. Becker; "Indications of X-Ray Diagrams of Cellulose Fibers," W. Kast; "Recent American Plastics," K. Stoeckhert; "Recent Views on the Formation of Phenol Resins," K. Hultzsch; "Low-Temperature Emulsion Polymerization of Butadiene," H. Logemann.

Production of Rubber Goods

Production of rubber goods in the Bizonal Area of Germany made good progress in 1948, amounting to 135,000 tons, an increase of about 75% over 1947 totals. Output of automobile tires rose from 1,000,000 units in 1947 to 2,000,000 in 1948, compared with 2,724,000 units in 1936. In the current year it is hoped to be able to increase output to 250,000 units monthly, whereby demand for private cars and small buses would be covered.

Manufacture of cycle tires showed a similar trend. Output in 1948 was about 8,500,000 units, against 4,000,000 in 1947. The new rate of cycle tire production aimed at is 1,100,000 to 1,200,000 units monthly, or 13,200,000 to 14,400,000 units a year, which is still considerably below the total of 29,448,000 units in 1936.

Following the monetary reform last year, which helped ease the raw material situation, the Metzeler Gummiwerke A.G., Munich, has reportedly been able to increase the manufacture of automobile tires by roughly 80%. Monthly output is now said to be about 26,000 tires. Tire production represents 70% of total production with mechanical rubber goods making up the balance. The firm presently employs 750 persons, as compared with 1,450 before the war. It hopes to be able to reenter the export field in the current year.

HOLLAND

Rubber Resumes Publication

Rubber, the organ of the Rubber Stichting (Rubber Foundation), Delft, has reappeared, and its pages indicate it is resuming with renewed vigor its work of promoting the use of rubber. The April, 1949, issue reminds us that the Rubber Stichting has just celebrated the first 12½ years of its existence, and its fine progress, despite the intervening war and trying initial postwar period, is demonstrated by photographs showing the group of four professional men with which the Foundation started in 1937, now increased to 15, and the large staff of all present workers.

Rupal Latex Cement

The April issue of *Rubber* contains a strikingly illustrated article on a new latex-cement flooring material known as Rupal, produced by the N. V. Bredasche Asphaltfabriek "Haagh" under license from the Rubber Stichting. Rupal is a postwar development by the Rubber Stichting of initial prewar experiments conducted at the affiliated research institute at Buitenzorg, Java. The new material, in which a very tough, woody product having approximately the same abrasion resistance as rubber, is the filler, can be readily spread and is said to combine with an attractive appearance great mechanical and chemical resistance, to be sound absorbing, and to have the heat-insulating properties of wood. To the Netherlands manufacturer it presents the added advantage of requiring no foreign currency since it is made of Dutch and Indonesian materials, and to the consumer, that of a moderate price.

At the Rubber Stichting, Rupal was found to adhere with great firmness to any kind of base including iron, glass, cement, and wood. The new flooring material also has very high resistance to abrasion as well as a desirable degree of hardness and elasticity. It is not stained or damaged by lye, ammonia, benzine, kerosene, vaseline, castor oil, water, ethyl ether and ethyl alcohol, acetone, wine, coffee, milk, or blood, it is further claimed. Sulfuric acid at concentrations of 25% leaves a stain, at 50% and over, destroys the surface. Muriatic acid stains, but does not damage the surface; 10% acetic acid is safe for Rupal; at 50% the acid stains, and at 100% attacks the surface of the material.

At first the great resistance to abrasion posed a problem in smoothing the surface, but a method of polishing has been developed said to give a fine, shiny finish. The material is supplied in a variety of colors, and decorative effects can be obtained by the use of contrasting borders and bands. Rupal floorings are recommended especially for ships, hopsitals, and homes.

Positex to Be Manufactured in Holland

Through the mediation of the Rubber Stichting, the Chemische Fabriek Helmitin (Maiburg, Dr. van Roon & Co., N. V.), Waalwyk, has obtained license to manufacture latex preparations of the Veedip, Ltd., Slough, England, including the positively charged latex known as "Positex."


Barrett
Barrett

FRANCE

Thermosensitivity of Degraded Latex

Thermosensitization of latex by biochemical degradation has already been the subject of investigation at the Institute Francais du Caoutchouc by Lepetit and Hooreman,[1] who tested the effects of powdered hog pancreas.

In his studies with the commercial ferment Desamulon N, Robert Delattre[2] obtained similar results. He applied the ferment in the form of a 10% aqueous suspension, in amounts ranging from 0.1 to 0.5% based on the weight of the latex, using a 60% ammoniated latex two years old. Samples of the latex were subjected to the digestive action of the ferment for varying periods, after which a 33% aqueous suspension of zinc oxide was added to the degraded latex, the amount of zinc oxide thus incorporated in the latex was 3% based on the weight of the rubber.

The changes in the mixes were checked by Ford viscosity measurements. The coagulation time was found for various temperatures and various periods of rest in the presence of the zinc oxide. Results of the experiments show that Desamulon is a suitable ferment for the biochemical degradation of latex. The period of digestion should be at least five days, and preferably 10 or more days, in order to get sufficiently short coagulation periods. The optimum coagulation temperature is 60°C,[1] but higher temperatures may be used. The resting period in the presence of zinc oxide should be between six and 22 hours. The optimum proportion of Desamulon N is 0.2%, but a smaller amount may be used.

The presence of a small amount of antiferment in the latex does not prevent its biochemical degradation by the ferment. The addition to a heat-sensitized degraded latex of 0.15 to 0.5% of antiferment LC considerably increases its stability in cold, without noticeably modifying its sensitivity at higher temperatures. The use of the rapid accelerator, 3 RN, and of other vulcanizing ingredients does not affect the thermosensitivity of the degraded latex.

[1] *Rev. gén. caoutchouc*, 25, 1, 395 (1948).
[2] *Ibid.*, 26, 6, 421 (1949).

Natural Rubber and Unsaturated Compounds

Since 1940 the Institut Français du Caoutchouc has been occupied with the problem of increasing the resistance of natural rubber to the action of aromatic hydrocarbons. Research is being based on the findings of Bacon and Farmer, who in 1938 showed that it was possible to combine maleic anhydride with rubber in solution by heating with benzoyl peroxide. It was reasoned that since certain synthetic rubbers containing the C≡N groups show little tendency to swell and have good mechanical and elastic properties, and since according to Bacon and Farmer it is possible to combine with rubber an activated unsaturated derivative like maleic anhydride, it might be possible and worthwhile similarly to combine with rubber activated ethylenic derivatives having the C≡N groups.

In a recent article Andre Delalande[1] discusses the reaction with N-methyl maleimide in the absence of oxygen and in the presence of peroxide of parabromobenzoyl. He found that the amount of N-methyl maleimide combined with rubber after heating for 16 hours at 130°C. is directly proportional to the amount introduced and to the square root of the parabromobenzoyl peroxide content, at least for low values of the latter.

Two different reactions were observed, a rapid reaction initiated by the decomposition of the peroxide, and a slow thermal reaction. The relative speeds of these two reactions at 130°C. corresponded to the ratio 1:150-200. From determinations of the unsaturation of the products obtained it was found that combination for the most part takes place outside the double bonds of the rubber, probably on the alpha-methylenic carbon atoms, confirming Farmer's ideas.

As to the mechanism of the process, it is suggested that this is probably a chain reaction involving free radicals.

The derivatives of rubber and N-methyl maleimide resemble those obtained by Bacon and Farmer with maleic anhydride. Depending on the content of the maleimide, the products vary from elastic, rubber-like substances, to yellowish fibrous products, to amorphous white powders which have lost all rubber characteristics. The solubility varies in the same way; the products become soluble in alcohol in heat, and in acetone in cold.

[1] *Rev. gén. caoutchouc*, 26, 6, 426 (1949).

Rubber Imports and Consumption

Consumption of natural and synthetic rubber in 1948 totaled 93,407 metric tons, against 72,000 in 1947. A partial breakdown of the consumption figures, in metric tons, follows:

	1948	1947
All tires	56,980	46,000
Automobile tires	39,070	32,555
Elastic thread	587.5	360
Rubberized fabrics	2,624	1,818
Hose and tubing	3,138	2,632
Belting	2,804	2,443
Sponge and cellular rubber	1,300	555
Footwear	4,167	2,679
Heels and soles	5,057	4,676
Toys and sporting goods	822	411
Surgical and sanitary goods	1,161	899
Mechanical rubber	6,111	4,434
Ebonite	785	657
Electric cables	4,612	3,665
Artificial leather	1,500	*

*No data available.

Fresneau Honored

The Paris Municipality has decided to name an avenue in the Bois de Vincennes, facing the Colonial Museum, Avenue Francois Fresneau in honor of the French engineer now credited with being the actual discoverer of *Hevea brasiliensis*. M. Fresneau, who had been sent to French Guiana in 1732 to build fortifications, was spurred on to search for the tree by the tales of the natives; he succeeded after many trials and tribulations in finding it in the forests of French Guiana and sent a report on his undertaking and find to France in 1749, which, however, was ignored at the time, apparently because de la Condamine had already received credit for the discovery of the fabulous rubber tree.

NORWAY

A recently patented bicycle whose rear wheel is little more than a rim and an inflated tube has just been exhibited in Oslo. Instead of the conventional bicycle wheel with hub and spokes, the new device is supported at three points inside the rim. At two of these points ball-bearing pulleys allow the rim to rotate; while at a third a rubber-surfaced drive wheel turns against the inside of the rim to power the vehicle. Power is supplied from conventional foot-pedals. It is claimed that the new invention puts 70% of the cyclist's weight into locomotion, and that the hubless wheel acts as its own shock absorber. The new type of bicycle is reported in the Oslo press to be going into mass production soon, and similar production plans have apparently been projected for other lands where patent rights have been secured by the Norwegian inventor.

ITALY

A German visitor to Italy reports[1] that by the end of 1948, Italy's industrial output was 25 to 30% above the 1938 level, a figure expected to reach 30 to 40% by 1953, as a result of ERP aid. The rubber industry here has participated in the upward swing, as is reflected in the country's imports of rubber. In 1938 these imports included 29,400 tons of natural and synthetic rubber; in 1946, the figure was only 17,840 tons, but rose to 29,700 tons in 1947, and to an estimated 31,000 tons in 1948. In addition some 10,000-12,000 tons of reclaimed rubber were used. Last year the Italian rubber industry also consumed 630 tons of latex, 8,000 tons of carbon black, and 8,100 tons of cotton. The program for 1951 envisages imports of rubber amounting to 41,000 tons, 840 tons of latex, 10,400 tons of carbon black, and 10,450 tons of cotton.

In 1938 the industry included 100 firms employing 38,000 factory and office workers. In 1948, 180 firms employed more than 46,000 persons; 102 of the firms are in Lombardy.

Tires account for 60% of the total output, footwear for 14%; while the remaining 26% is made up of mechanical and sanitary rubber goods and wires and cables.

According to the German reporter, it is estimated that 60,000 tons of rubber goods were produced in 1947, of which 35,000 tons included tires of all kinds; 1948 production may have reached a total of 68,000 tons, which it is hoped to raise to 90,000 tons by 1951, with tires accounting for 44,000 tons. Still he is not very optimistic about the future; he finds the industry is beginning to feel the effects of mounting costs for labor, taxes and general expenses, which in turn have forced higher prices for finished goods, with growing consumer resistance as a result, despite the fact that home needs have not nearly been met. At the same time foreign business is slowing up.

[1] *Kautschuk & Gummi*, 2, 2, 35 (1949).

Fewer Tires Made in Spain

Lower rubber imports and power shortages in 1948 have had the effect of reducing Spain's output of automobile and truck tires by 10%, as compared with that of 1947. The decrease in production was more marked in the second half of 1948 than in the first half; the respective totals were 204,846 and 264,518 units. The total 1948 production of 469,364 units compared with total output of 518,801 units in 1947.

Rubber Goods Output up in Japan

Production of rubber goods increased in Japan in 1948 as compared with 1947 output, as may be seen from the following:

Item	1948	1947
Truck tires	369,080	173,036
Tubes	379,594	172,442
Passenger-car and motorcycle tires	181,796	80,319
Tubes	185,087	95,870
Other vehicle tires	19,948	7,667
Tubes	21,217	18,957
Bicycle tires	3,796,760	3,016,223
Tubes	3,872,051	3,038,336
Rubber footwear ... *prs.*	28,356,766	21,847,563

Cotton as a Raw Material

(*Continued from page 576*)

In conclusion, we can say that the cotton industry no longer thinks that cotton has to be used because it always has been used and, consequently, does not require improvement. Research in all phases of cotton production and utilization has already resulted in better quality cotton at reduced cost. The failure or success of such work will probably determine whether cotton will continue to lose markets to the available synthetic fibers, or whether it will regain some of those markets already lost.

Editor's Book Table

BOOK REVIEWS

"Silicones and Other Organic Silicon Compounds." Howard W. Post. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. Cloth, 6 by 9 inches, 234 pages. Price $5.

This book offers complete, evaluated information up through early 1948 on the chemistry and applications of organic silicon compounds. Following the introduction is a chapter on halogenated silanes used as intermediates in the preparation of organic silicones. The third chapter covers the work of Kipping and others as a preliminary to the current so-called "industrial era" where major work in this field was and is being performed by industrial scientists in the United States. The fourth and fifth chapters cover journal and patent literature, respectively, on organic silicon compounds prepared at moderate temperature. High temperature work, both industrial and academic, is grouped into the sixth chapter. Chapter seven describes commercial applications of silicones based on patent literature and industrial publications. The preparation of organic silicon compounds analogous to ethers and amines is the subject of the eighth chapter; while chapters on nomenclature and physical properties conclude the book. A bibliography of 707 references is appended, together with comprehensive author and subject indices.

"Contributions to the Theories of Vulcanization, Chiefly Based on the T-50 Test." Normann Bergem. Published by Department for Research and Development, A/S Askim Gummivarefabrik, Askim, Norway. Cloth, 6 by 8 inches, 210 pages. Price $4.20.

The usefulness, within its understood limitations, of the T-50 test is brought out by this valuable book, which provides extensive original data on the theoretical aspects and physical nature of the test. To determine whether the T-50 value is affected by the mode of sulfur-rubber combination in addition to the state of cure, a series of systematic experiments was undertaken and is described in this book. The extensiveness of the work is indicated by the inclusion of some 81 figures and 83 tables, almost all of which represent original work. The author notes, however, that exact interpretation of the experimental results depends on the complete understanding of the test, a satisfactory theory for which has not been derived as yet. Many of the experiments on the physical nature of the test are therefore included.

The book is divided into five main sections. The first part covers chemical and physical properties of rubber and includes results of X-ray spectrography and and temperature-volume relation work. The second section describes the T-50 test, its development, influencing factors, test theory, effect of various ingredients, and its use in non-sulfur and balata vulcanizates. The dissolution and fractionation of vulcanized rubber are considered in the third section; while the fourth deals with the decrease in unsaturation during vulcanization. The concluding section presents a discussion of the experimental observations and their bearing on the mechanism of vulcanization reactions.

A six-page summary, covering inferences to be drawn from the data in the preceding sections, is appended, together with an author and subject index.

"How to Keep Invention Records." Harry A. Toulmin, Jr. Research Press, Inc., 137 N. Perry St., Dayton 2, O. Cloth, 5½ by 8 inches, 86 pages. Price $2.50.

The protection of patent property by the keeping of adequate invention records is the subject of this book. Thousands of dollars are lost annually by the failure of inventors and their associates to keep adequate records of their inventions, their development and reduction to practice, and early commercial history. The book is divided into three sections. The first section, "Protection of Industrial Property," covers monopolies granted by governments, including patents, trade marks, labels, prints, and copyrights, and also foreign protection. "Record Forms," the second section, discusses a series of 12 forms as a practical method of insuring proper recording of dates in the development and commercialization of an invention. The concluding section, "Patent Investigations," deals with purchase of patents, infringement, patent validity, patent title, and similar topics.

NEW PUBLICATIONS

Publications of Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass. **"Cabot Carbon Blacks—Electrical Conductivity Study."** Vol. II, No. 5, April, 1949. 12 pages. Tabulations and graphs of test data show the effect of carbon black on the electrical conductivity of rubber vulcanizates. Tests were made with natural rubber, GR-S, and GR-M-10, using varying loadings of different Cabot blacks, including HMF, CC, HPC, EPC, and FF types. Also included is a description of the method used for measuring the D.C. resistance of rubber. **"Carbon Black Pigments."** Vol. II, No. 6, May, 1949. 16 pages. This booklet describes Cabot's black pigments for the paint, ink, plastics, and paper industries; gives information on pelletized blacks, packaging, and properties of the different blacks; and lists domestic and foreign sales agents.

Publications of Dow Corning Corp., Midland, Mich. **"Dow Corning Silicone Greases."** Silicone Notes No. D-5. 4 pages. The properties, performance characteristics and applications of the company's heat-stable and oxidation-resistant silicone lubricants are tabulated in this bulletin. **"How to Use DC 44 Silicone Grease in the Bearings of Electric Motors."** Silicone Notes No. D-6. 4 pages. This bulletin gives detailed information on the quantity of DC 44 Silicone Grease to be used in various types and sizes of bearings in electric motors.

Publications of British Rubber Producers' Research Association, 48 Tewin Rd., Welwyn Garden City, Herts., England. No. 109. **"Absorption Spectra and Structure of Organic Sulfur Compounds. Part I. Unsaturated Sulfides. Part II. Disulfides and Polysulfides. Part III. Vulcanization Accelerators and Related Compounds. Part IV. Unsaturated Sulfones."** H. P. Koch. 32 pages. This group of four papers deals with ultra-violet absorption data for various compounds, and the information obtained is used to characterize some of the components of vulcanized rubber. No. 110. **"The Primary Thermal Oxidation Product of Squalene."** J. L. Bolland and H. Hughes. 6 pages. The constitution of the peroxide formed by the action of molecular oxygen on squalene is investigated, and evidence presented that the first oxidation product is a di-peroxide. No. 111. **"Kinetic Studies in the Chemistry of Rubber and Related Materials. Part V. The Inhibitory Effect of Phenolic Compounds on the Thermal Oxidation of Ethyl Linoleate."** J. L. Bolland and P. ten Have. 10 pages. The influence of the detailed structure of phenols on their antioxidant activity in rubber is investigated and discussed. No. 112. **"Ultrasonic Dispersion in Organic Liquids."** A. Schallamach. 8 pages. The velocities of sound at various frequencies and temperatures were investigated in geraniol, di-dihydrocitronellyl ether, castor oil, and isobutyl alcohol. The measurements covered temperature and frequency ranges where dielectric relaxation occurs, but no connection between the two effects was found.

"Your Consultant." Vol. 1, No. 1, May, 1949. Association of Consulting Chemists & Chemical Engineers, Inc., 50 E. 41st St., New York 17, N. Y. 4 pages. This issue is the first of the Association's new publication. News of Association meetings is given together with short notes on activities of member consultants.

"Plasticized Polyvinyl Chloride Formulations." Technical Bulletin O-D-113. Monsanto Chemical Co., St. Louis, Mo. 12 pages. Twenty-two plasticized polyvinyl chloride formulations, based on laboratory and field work, are presented herein as representative of types used in a wide range of articles, from shower curtains to floor tile. A comprehensive list of suppliers of polyvinyl chloride resins, plasticizers, and stabilizers is also included.

"'Carbonex' 644 Rubber Compounding Hydrocarbon in Natural Rubber." Rubber Laboratory Release No. 11, June, 1949. Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 20 pages. Extensive laboratory test data appear on the effect of varying quantities of "Carbonex" 644 in natural rubber compounds. Properties tested include Garvey die extrusion, stress at 300 and 500%, tensile strength, elongation, permanent set, hardness, angle tear resistance, du Pont abrasion resistance, De Mattia cut-growth resistance, compression set, Yerzley resilience, Goodyear-Healey impact resilience, and Goodrich compression fatigue.

"Census of Manufactures—1947. Rubber Products—Tires and Inner Tubes, Rubber Footwear, Reclaimed Rubber, Rubber Industries Not Elsewhere Classified." 8 pages. United States Department of Commerce, Bureau of Census, Washington, D. C. Copies obtainable from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 10¢. The 1947 Census of Manufactures is the first taken since 1939. Important data on the four major branches of the industry, according to Commerce Department classification indicated in the title, are included in seven tables in this publication. Most important tables are probably those showing quantity and value of products and quantity and cost of rubber consumed by establishments classified in the rubber products industries, by type of rubber and by class of products made. Other tables give statistics for divisions of the industry and states and by size of establishment.

"Tlargi Year Book, 1949" Los Angeles Rubber Group, Inc., Mayfair Hotel, Los Angeles 14, Calif. 79 pages. This edition of the Year Book gives reviews of the Group's 1948 meetings, a membership list, lists of Pacific Coast rubber manufacturers and suppliers, and the Group's by-laws. Technical features include tables of GR-S polymers, physical test specifications for various rubbers, solubilities of unvulcanized elastomers, glossary of accelerators and antioxidants, dangerous chemicals regulations, properties of solvents, and hardness conversion chart.

"Symposium on Aging of Rubbers." Special Technical Publication No. 89. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 72 pages. Cloth, $2.40. Paper, $1.75. The papers and discussions included in this booklet were presented at the ASTM meeting in Chicago, Ill., on March 2, 1949. Following an introduction by G. C. Maassen, papers given include: "The Mode of Attack of Oxygen on Rubber," A. M. Neal and J. R. Vincent; "Oxygen-Absorption Methods, Their Utility and Limitations in the Study of Aging," J. R. Shelton; "Chemical Changes in Elastomers and Antioxidants during Aging," John O. Cole; "Physical Aspects of the Aging of Rubbers," M. C. Throdahl; "The Effects of Light and Ozone on Rubber," John T. Blake; and "The Effect of Temperature on the Air Aging of Rubber Vulcanizates," M. G. Schoch, Jr., and A. E. Juve.

"Informative Labeling Program." The Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y. 17 pages. This report, prepared by the Society's Informative Labeling Committee, defines informative labeling and its benefits and presents a plan for such labeling, with suggestions on how to put the plan into effect and information on promoting the plan.

"Indonex Plasticizers in Wire and Cable Jacket Compounds." Circular No. 13-34, May 15, 1949. Indoil Chemical Co., 910 S. Michigan Ave., Chicago 80, Ill. 16 pages. Formulations and test data, both before and after aging, are shown in this report on the use of Indonex 638½ in a series of wire and cable compounds using natural rubber, GR-S, and neoprene. ASTM, Underwriters Laboratories, and SAE specifications around which the test compounds have been formulated are also given.

"Butex for Light and Ozone Resistance." Report No. 12, June 1, 1949. Midwest Rubber Reclaiming Co., East St. Louis, Ill. 4 pages. Formulations and test data are presented to show how Butex, a Butyl inner-tube reclaim, can be compounded alone and with GR-S, GR-I, and neoprene to withstand light and ozone weathering. All compounds were mixed both with and without the addition of a protective wax.

Publications of Hercules Powder Co., Wilmington 99, Del. **"Hercules Synthetic Resins."** Form 965-2M-56186. 2 pages. **"Hercules Synthetic Resin Solutions."** Form 966-2M-56185. 2 pages. These revised charts on available synthetic resins and resin solutions give trade names of the materials, brief chemical descriptions, and typical data such as acid number, color, softening point, and viscosity ratings.

"Materials of Construction for Flowrator Instruments." Catalog Section 97. Fischer & Porter Co., Hatboro, Pa. 4 pages. This bulletin lists the recommended materials for use in Flowrator instrument fittings, floats, and packings exposed to hundreds of different corrosive chemicals and materials.

"Compounding Rubber with Petroleum Products." F. S. Rostler and H. W. Sternberg. G. B. Report No. 4, March, 1949. Golden Bear Oil Co., Los Angeles, Calif. 32 pages. A reprint from *Industrial and Engineering Chemistry*, this report covers a method of correlating chemical characteristics of petroleum products with their behavior as rubber compounding ingredients. The method is based on a quantitative chemical analysis and identification of groups of components, with the ingredients presented as chemicals rather than as proprietary products with trade names.

"Chemical Process Engineering." R. S. Aries & Associates, Brooklyn 2, N. Y. 6 pages. Besides information on personnel and range of work, this leaflet covers services in chemical process engineering, including preliminary economic evaluation, plant and process design, plant location, plant construction, and plant and process operation.

"Belfield Diaphragm Control Valves, Series 700." Bulletin 700-1. Minneapolis-Honeywell Regulator Co., Philadelphia 44, Pa. 32 pages. Descriptions and drawings of the diaphragm motor controlled valve are given, together with information on the different types available, and data on dimensions, ratings, shipping weights, etc.

"Composition and Constants of Fatty Acids." Technical Bulletin 77. Archer-Daniels-Midland Co., Minneapolis 2, Minn. 6 pages. Compiled by the company's research staff, this publication is a chart showing the chemical compositions and analytical constants of 23 vegetable oils and all commercially available animal and marine fats and oils. Both the mean analysis and analytical range of saturated and unsaturated fatty acids are given for each fat and oil.

"Korfund Elasto-Rib." Bulletin ER-701. Korfund Co., Inc., Long Island City 1, N. Y. 4 pages. Elasto-Rib, a vibration mounting consisting of a layer of cork between two layers of grooved oil-resistant synthetic rubber, is described in this bulletin. Properties and advantages of the material appear, together with illustrations of typical dampers and applications.

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Corrugated Conveyer Belt

(*Continued from page 624*)

abrasion resistance of this belt is claimed to be comparable to that of a good quality tire tread.

The individual corrugations are designed in shape and strength for maximum traction. Flexing the belt around the pulleys will usually prevent the accumulation of dirt, but the corrugations may be easily brushed out if necessary. Made in 250-foot rolls, the belt is available in several thicknesses and in standard widths up to 24 inches.

Market Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

	May 28	June 25	July 2	July 9	July 16	July 23
No. 1 Contract:						
Sept.	16.61	16.35	16.35	16.20	16.48	16.20
Nov.	16.54	16.25	16.28	16.11	16.32	16.11
Jan.	16.45	16.09	16.10	15.94	16.15	15.97
Mar.	16.35	15.85	15.80	15.68	15.95	15.85
May	16.25	15.75	15.70	15.58	15.85	15.75
July	16.15	15.65	15.60	15.48	15.75	15.65
Total weekly sales, tons	5,760	3,470	5,350	3,030	5,790	5,620

PRICES fluctuated irregularly on the Commodity Exchange during July, with most activity centered in hedging and switching operations into the more distant months, notably September, December, and March. Trading was quiet during the first few days of the month as news on possible Sterling devaluation was awaited. With the denial of such devaluation, trading picked up, and prices moved upward. Toward the end of the second week in July, offerings of Dutch rubber at low prices sent prices off, and the balance of the month saw price fluctuations in a narrow range.

Reports from London during mid-July stated that ECA purchases of 9,000 tons of rubber for stockpiling had been made, and other purchases are being planned, although total purchases under present arrangements are expected to be about 15,000 tons. These ECA purchases played an important part in stabilizing the London market, with subsequent reflection in the Commodity Exchange. The Singapore market was reported as quite active, with purchases being made by Russia and several other European nations. These optimistic effects were counterbalanced late in the month by the decision of the Senate Appropriations Committee to rescind $275,000,000 in contract authority for stockpiling. Further Congressional action on this reduction is being awaited with interest.

September futures started the month at 16.35¢, rose to a high of 16.75¢ on July 12 and 13, then fell off and closed at 16.25¢ on July 29. December futures began at 16.25¢ on July 1, rose to 16.55¢ on July 12 and ended the month at 16.05¢. Total volume of sales was 19,550 tons, as compared with 21,680 tons sold during June.

New York Outside Market

WEEK-END CLOSING PRICES

	May 28	June 25	July 2	July 9	July 16	July 23
No. 1 R.S.S.:						
July-Sept.	16.75	16.50	16.38	16.13	16.50	16.25
Oct.-Dec.	16.75	16.38	16.25	16.13	16.50	16.25
No. 3 R.S.S.	15.38	14.88	14.63	14.50	14.38	14.25
No. 2 Brown	15.00	14.50	14.38	14.25	14.25	14.13
Flat Bark	12.00	12.00	12.00	11.75	11.75	11.75

AS ALWAYS, the factors affecting rubber futures trading on the Exchange were also evident in activity in the New York Outside Market during July. Prices for physical rubber dipped at first, rose during the second week, then fell off and moved irregularly during the balance of the month. Only spotty factory interest was noted, derived almost exclusively from the smaller companies.

The spot price for No. 1 sheets started the month at 16.38¢, reached a high of 16.88¢ on July 12 and 13, then fell off to close the month at 16.25¢, for a monthly average price of 16.50¢. No. 3 sheet prices showed corresponding movement, beginning with 14.88¢ on July 1, fluctuating between 14.13 and 14.88¢ during the month, and closing at 14.25¢ on July 29. No. 2 Brown prices moved in the 14.00-14.50¢ range; while Flat Bark prices fluctuated between 11.63¢ and 12.13¢ during the month.

Latices

GR-S latex continues as a utility material in tires, adhesives, coatings, and saturants, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's July *Rubber Report*. GR-S latex shows lower costs than *Hevea* latex and, in some cases, technical advantages in performance, but the lower *Hevea* prices are resulting in some review of GR-S latex applications. The price of *Hevea* latex in bulk continues at the 25.5-28.5¢ per pound level, awaiting further developments in the solid rubber market.

Mr. Nolan gives estimated figures for *Hevea* latex in May as follows: imports, 2,191 long tons, dry weight; consumption, 2,817 long tons; and month-end stocks, 8,293 long tons. These stocks represent a new low and, at current consumption, are less than a 90-day supply. Consumption of *Hevea* latex continues at high levels with expectancies for further steady increases with rising use in latex foam. Production of GRS latex during May is estimated at 1,524 long tons, dry weight. GR-S latex bulk prices continue unchanged at 18.5-20.25¢ per pound.

SCRAP RUBBER

THE July scrap rubber market was quiet, with domestic business slowed down because of the vacation schedule at consuming mills. A decrease in export business also took place with the completion of the German and Japanese shipments. Most export business during July was said to be of the clean-up type, although some sales were made at prices slightly above the domestic market. No upswing in demand for scrap rubber in the domestic market is expected until the fall, but some factors believe that trading in August will be at a higher level.

Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$12.50	$13.50
Peelings, No. 1	52.25	52.25
3	30.25	30.25
	(¢ per Lb.)	
Black inner tubes	4.00	4.00
Red passenger tubes	7.50	7.50

RECLAIMED RUBBER

THE reclaimed rubber market was quiet during July as the customary summer dullness and vacation period prevailed. Production and consumption of reclaim remained at relatively high levels; while exports continued at a steady pace. Price reductions of 0.25¢ a pound were announced on whole tire and peel reclaims; while black natural rubber inner-tube reclaims were reduced 1.25¢ a pound. These reductions were said to be in keeping with the trend of the times, although not completely justifiable on a cost basis.

Final April and preliminary May statistics on the domestic reclaimed rubber industry are now available. In April, production totaled 18,463 long tons; consumption, 18,649 long tons; exports, 1,070 long tons; and month-end stocks, 32,825 long tons. Preliminary figures for May give a production of 18,025 long tons; consumption, 18,315 long tons; and month-end stocks, 32,338 long tons. Preliminary estimates of May exports were 887 tons.

Current prices for reclaimed rubber follow:

Reclaimed Rubber Prices

	Sp. Gr.	¢ per lb.
Whole tire	1.18-1.20	8.25/ 8.75
Peel	1.18-1.20	8.25/ 9.25
Inner tube		
Black	1.20-1.22	11.50/12.50
Red	1.20-1.22	14 /14.5
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE

WEEK-END CLOSING PRICES

Futures	May 28	June 25	July 2	July 9	July 16	July 23
Oct.	28.97	29.38	29.56	29.45	29.64	29.52
Dec.	28.79	29.26	29.47	29.32	29.54	29.51
Mar.	28.66	29.14	29.37	29.24	29.48	29.47
May	28.48	29.04	29.27	29.13	29.35	29.34
July	27.72	28.43	28.67	28.55	28.78	28.83
Oct.	25.54	26.08	26.35	26.14	26.61	26.91

PRICE movements were mixed on the New York Cotton Exchange during July. Spot cotton, representing the last old crop month, fell irregularly, but the distant months held firm. Trading was essentially professional in nature, with brief advances and declines predominating the market. A more optimistic outlook was evident as traders expect large-scale ECA purchasing during the third quarter and continuation of the 90% support level to cover the 1950 crop.

The 15/16-inch middling spot price started the month at 33.51¢, reached a high of 33.57¢ on July 5, fluctuated irregularly for the next week, then declined steadily to a low of 32.38¢ on July 26 and closed the month at 32.61¢. October futures began the month at 29.56¢, reached a high of 29.76¢ on July 18, and ended the month at 29.73¢.

Fabrics

The usual summer dullness was evident in the wide industrial gray goods market last month. Sales were spotty in ducks, chafers, and sheetings, but sateens and wide drills moved briskly to the coating trade. Chafers were ordered in limited quantity for August delivery; while hose and belting ducks were very quiet. The lower price levels in print cloths induced a strong wave of buying during the middle of July as converters stocked up on different constructions. While only limited interest has been shown in sheetings during the past few months, an improvement in tone was evident during July, and good business is expected shortly in these fabrics. Interest in osnaburgs continued at a low level, with small lots sold in the 40-inch 40x26 2.11-yard construction, and no immediate improvement is expected.

Current prices for cotton fabrics are listed below:

Cotton Fabrics

Drills		
59-inch 1.85-yd	yd.	$0.37
2.25-yd		.33
Ducks		
38-inch 1.84-yd. S. F.	yd.	.425
2.00-yd. D. F.		.31/.325
51.5-inch 1.35-yd. S. F.		.52
66-inch 1.02-yd. S.F		.73
Hose and belting		.62
Osnaburgs		
40-inch 3.65-yd	yd.	.1325/.135
Raincoat Fabrics		
Bombazine, 64 x 60 5.35-yd.	yd.	.1825
Print cloth, 38½-inch, 64 x 60		.1263
Sheeting, 48-inch, 4.17-yd.		.23
52-inch3.85-yd		.2488
Chafer Fabrics		
14-oz./sq. yd. Pl.	lb.	.66
11-65-oz./sq. yd. S.		.60
10-80-oz./sq. yd. S.		.62
8.9-oz./sq. yd. S.		.65
14-oz./sq. yd. S.		.59
Other Fabrics		
Headlining, 59-inch 1.35-yd, 2-ply	yd.	.565
64-inch 1.25-yd. 2-ply		.6063
Sateens, 53-inch 1.32-yd.		.57
58-inch 1.21-yd		.6238
Tire Cords		
K. P. std., 12-3-3	lb.	.685
12-4-2		675

RAYON

TOTAL production of cotton, rayon, and nylon tire cord and fabric in the first quarter of 1949 amounted to 129,000,000 pounds, a figure equal to the previous quarter. Of this total, 69,000,000 pounds consisted of rayon and nylon fabric and cord. Total cotton tire fabric and cord production was 60,000,000 pounds, comprising 33,000,000 pounds of woven tire fabric, 11,000,000 pounds of tire cord, and 16,000,000 pounds of chafer and other tire fabrics. Cotton tire cord and fabric production showed a decline for the fourth successive quarter and was 32% below the level recorded during the first quarter of 1948. Conversely, rayon and nylon tire cord and fabric continued to gain, and showed an increase of 13% over the first quarter of 1948.

Domestic deliveries of rayon in June totaled 67,600,000 pounds, as compared with 59,400,000 pounds in May. Of this total, 56,800,000 pounds were filament yarn; while 10,800,000 pounds were staple and tow. Of the June rayon yarn shipments, 41,300,000 pounds were viscose and cupra, and 15,500,000 pounds were acetate yarn. High-tenacity yarn shipments in June amounted to 24,500,000 pounds. Producers' stocks of rayon yarn and staple at the end of June were 69,000,000 pounds.

There were no changes in rayon tire yarn and fabric prices during July, and current prices are listed below:

Rayon Fabrics

Tire Yarns		
1100/480	$0.55	
1100/490	.55	
1150/490	.55	
1650/720	.54	
1650/980	.54	
1900/980	.54	
2200/960	.53	
2200/980	.53	
4400/2934	.55 /	.56
Tire Fabrics:		
1100/490/2	.67	
1650/980/2	.645 /	.66
2200/980/2	.63	

Trade Marks

(Continued from page 616)

508,755. **Octo.** Erasers. A. W. Faber-Castell Pencil Co., Inc., Newark, N. J.

508,798. **Favorite.** Combs. S & G Rubber Co., Inc., New York, N. Y.

508,849. Representation of a geometric figure containing the word: "**Rubber-Hyde.**" Rubber base paints. W & W Auto Finishes, Inc., Boston, Mass.

508,873. **Nostik.** Rubber separating paper. Ace Paper Co., Inc., New York, N. Y.

508,883. **Bemis.** Flexible tubing. Bemis Bag Co., St. Louis, Mo.

508,898. **Guardian.** Tires. United States Rubber Co., New York, N. Y.

508,910. **Worthy.** Golf balls. Worthington Ball Co., Elyria, O.

508,952. **Gart-eez.** Garter belts. Malibu Brassiere Co., Los Angeles, Calif., assignor to A. P. Waldman, doing business as Malibu Brassiere Co.

508,984. **Fold-Spray.** Fountain syringes. Armstrong Cork Co., Lancaster, Pa.

508,999. **Sterlprene.** Gaskets. Sterling Packing & Gasket Co., Houston, Tex.

United States Rubber Statistics—April, 1949

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		Month-End
	Production	Imports	Total	Consumption	Exports	Stocks
Natural rubber, total	0	48,262	48,262	44,981	315	103,383
Latex, total	0	2,271	2,271	2,878	0	9,533
Rubber and latex, total	0	50,533	50,533	47,859	315	112,919
Synthetic rubber, total	*30,858 †4,587	881	36,326	36,454	506	115,054
GR-S	*25,556 †349	822	26,727	28,544	98	‡94,969
Neoprene	†3,163	0	3,163	2,580	282	4,638
Butyl	*5,302	59	5,361	4,882	0	12,465
Nitrile	†1,075	0	1,075	448	126	2,982
Natural rubber and latex, and synthetic rubber, total	35,445	51,414	86,859	84,313	821	227,970
Reclaimed rubber	18,463	0	18,463	18,649	1,070	32,825
GRAND TOTALS	53,908	51,414	105,322	102,962	1,891	260,795

*Government plant production.
†Private plant production.
‡Includes 110 tons shipped for export but not cleared.
SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory, May, April, 1949; First Five Months, 1949, 1948

	May, 1949	% of Change from Preceding Month	April, 1949	First Five Months, 1949	First Five Months, 1948
Passenger Casings					
Shipments					
Original equipment	2,103,465		2,426,632	10,410,461	8,441,259
Replacement	3,764,234		3,202,451	14,047,571	15,515,671
Export	40,967		37,567	200,679	298,845
TOTAL	5,908,666	+ 4.27	5,666,650	24,658,711	24,255,775
Production	5,980,837	+ 0.69	5,939,645	26,836,243	28,317,377
Inventory end of month	10,769,289	+ 0.60	10,705,291	10,769,289	9,448,439
Truck and Bus Casings					
Shipments					
Original equipment	276,622		344,860	1,735,530	2,357,315
Replacement	559,483		515,609	2,666,804	2,912,038
Export	78,932		83,624	426,960	478,900
TOTAL	915,037	− 3.08	944,093	4,829,294	5,748,253
Production	953,489	− 6.49	1,019,670	5,421,669	6,358,138
Inventory end of month	2,531,914	+ 1.88	2,485,314	2,531,914	2,162,669
Total Automotive Casings					
Shipments					
Original equipment	2,380,087		2,771,492	12,145,991	10,798,574
Replacement	4,323,717		3,718,060	16,714,375	18,427,709
Export	119,899		121,191	627,639	777,745
TOTAL	6,823,703	+ 3.22	6,610,743	29,488,005	30,004,028
Production	6,934,326	− 0.36	6,959,315	32,257,912	34,675,515
Inventory end of month	13,301,203	+ 0.84	13,190,605	13,301,203	11,611,108
Passenger and Truck and Bus Tubes					
Shipments					
Original equipment	2,379,948		2,766,897	12,126,160	10,784,817
Replacement	2,829,647		2,551,952	12,639,984	14,615,539
Export	86,468		77,562	431,821	453,597
TOTAL	5,296,063	− 1.86	5,396,411	25,197,965	25,553,953
Production	6,088,164	+ 0.48	6,058,992	28,078,877	27,992,783
Inventory end of month	12,410,463	+ 5.64	11,747,607	12,410,463	10,068,828

NOTE. Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc., New York, N. Y.

United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

	April, 1949	
	Quantity	Value
Imports for Consumption of Crude and Manufactured Rubber		
UNMANUFACTURED, Lbs.		
Crude rubber	108,107,424	$18,167,840
Rubber latex	5,086,303	1,219,404
Balata	196,786	48,244
Jelutong or Pontianak	31,637	8,753
Gutta percha	35,802	9,878
Chicle	956,285	644,435
Synthetic rubber	1,973,609	374,574
Scrap rubber	1,221,935	18,027
TOTALS	117,609,781	$20,491,155
MANUFACTURED		
Tires: auto, bus, truck ... no.	69	$815
Bicycle ... no.	38	55
Inner tubes: auto, etc. ... no.	152	660
Rubber footwear:		
Boots ... prs.	106	206
Shoes and overshoes ... prs.	15,240	7,735
Rubber-soled canvas shoes ... prs.	3,055	2,071
Rubber balls: golf ... no.	3,180	1,125
Tennis ... no.	6,180	1,843
Other athletic ... no.	635,356	74,884
Toys, except balloons	...	12,423
Hard rubber goods: sundries, except combs	...	75
Other	...	735
Rubber and cotton packing ... lbs.	1,852	2,525
Gaskets and valve packing	...	141
Belting ... lbs.	6	13
Hose and tubing	...	2,008
Gutta percha manufactures ... lbs.	1,100	786
Rubber bands ... lbs.	1,800	850
Synthetic rubber products	...	139
Other soft rubber goods	...	22,101
TOTALS		$131,190
GRAND TOTALS, ALL RUBBER IMPORTS	...	$20,622,345
Exports of Domestic Merchandise		
UNMANUFACTURED, Lbs.		
Chicle and chewing gum bases	285,162	$158,858
Balata	480	1,512
Synthetic rubber: GR-S	218,763	44,223
Neoprene	632,984	222,307
Nitrile	281,519	134,651
"Thiokol"	1,600	914
Polyisobutylene	3,540	685
Other, except Butyl	1,646	1,046
Reclaimed rubber	2,397,675	195,516
Scrap rubber	2,094,340	57,008
TOTALS	5,917,709	$816,720
MANUFACTURED		
Rubber cement ... gals.	43,791	$81,865
Rubberized fabric: auto cloth ... sq. yds.	7,934	11,935
Piece goods and hospital sheeting ... sq. yds.	97,037	81,644
Rubber footwear:		
Boots ... prs.	4,782	19,538
Shoes ... prs.	33,081	47,748
Rubbers-soled canvas shoes ... prs.	26,180	53,936
Soles ... doz. prs.	19,861	49,514
Heels ... doz. prs.	43,625	44,236
Rubber soling and toplift sheets ... lbs.	71,213	19,872
Gloves and mittens ... doz. prs.	13,667	49,366
Drug sundries: water bottles and fountain syringes ... no.	18,418	13,058
Other	.....	210,581
Rubber and rubberized clothing	.....	148,399
Balloons	.....	37,736
Rubber toys and balls	.....	14,068
Erasers ... lbs.	25,467	20,444
Hard rubber goods: battery boxes ... no.	28,451	32,003
Other electrical goods, lbs.	80,495	38,933
Combs, finished ... doz.	5,515	7,888
Other	.....	7,810
Tire casings: truck and bus ... no.	94,192	3,818,456
Auto ... no.	48,682	629,510
Farm tractors, etc. ... no.	22,399	673,074
Other off-the-road ... no.	6,213	391,123
Tires and casings: aircraft ... no.	1,091	62,713
Bicycle ... no.	16,754	20,967
Motorcycle ... no.	504	2,358
Other ... no.	2,742	29,579
Inner tubes: auto, truck, bus ... no.	84,573	282,268
Other ... no.	32,540	111,050
Solid tires: truck and industrial ... no.	6,647	$364,330
Tire repair materials: camelback ... lbs.	181,188	49,527
Other ... lbs.	150,687	96,446
Rubber and friction tape ... lbs.	41,670	31,063
Belting: auto and home ... lbs.	123,662	143,216
Transmission: V-belts lbs.	141,184	230,330
Flat belts ... lbs.	89,216	94,976
Other ... lbs.	66,702	72,656
Conveyer and levitator ... lbs.	168,605	119,856
Other ... lbs.	161,856	146,799
Hose and tubing ... lbs.	654,574	413,019
Rubber packing ... lbs.	132,188	134,016
Mats, flooring, tiling ... lbs.	728,076	179,631
Rubber thread: bare ... lbs.	29,054	33,883
Textile covered ... lbs.	15,300	34,273
Gutta percha manufactures ... lbs.	3,389	9,252
Latex and other compounded rubber for further manufacture ... lbs.	350,750	105,698
Other natural and synthetic rubber manufactures	.....	331,001
TOTALS	.....	$9,601,644
GRAND TOTALS, ALL RUBBER EXPORTS	.....	$10,418,364
Reexports of Foreign Merchandise		
UNMANUFACTURED, Lbs.		
Crude rubber	706,251	$165,632
Balata	10,742	7,550
TOTALS	716,993	$173,182
MANUFACTURED		
Rubber soling and toplift sheets ... lbs.	1,805	$526
Drug sundries, except syringes and hot water bottles	.....	748
Rubber toys and balls	.....	1,393
Erasers ... lbs.	1,320	350
Tire casings: truck and bus ... no.	15	943
Inner tubes, except auto, truck, bus ... no.	23	108
Tire repair materials, except camelback ... lbs.	315	172
Rubber packing ... lbs.	700	597
Other natural and synthetic rubber manufactures	.....	456
TOTALS	.....	$5,293
GRAND TOTALS, ALL RUBBER REEXPORTS	.....	$178,475

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

Borg-Warner Corp., Chicago, Ill. First five months, 1949: net earnings, $9,462,000, against $11,654,000 in the 1948 months; sales, $122,955,000, against $131,012,000.

FINANCIAL

Brunswick-Balke-Collender Co., Chicago, Ill., and subsidiaries. First half, 1949: net profit, $156,128, equal to 20¢ each on 450,000 common shares, against $502,091, or 96¢ a share, in the 1948 half; net sales, $10,895,559, against $12,055,377; federal tax provision, $145,000, against $300,000.

Dayton Rubber Co., Dayton, O. Six months to April 30: net profit, $69,256, equal to 5¢ each on 453,341 common shares, compared with $249,798, or 45¢ a share, a year earlier; sales, $11,695,048, against $13,211,248.

Eagle-Picher Co., Cincinnati, O., and consolidated subsidiaries. Six months ended May 31: $1,833,887, equal to $2.06 each on 887,076 capital shares, contrasted with $1,870,032, equal to $2.10 each on 889,076 shares, in the like period last year; net sales, $32,591,184, against $35,805,904.

Endicott Johnson Corp., Endicott, N. Y., and subsidiaries. Six months ended May 28: net profit, $1,046,748, equal to $1.11 each on 810,720 common shares, compared with $1,629,956, or $1.83 a share, a year earlier; net sales, $62,352,907, against $73,694,815.

Firestone Tire & Rubber Co., Akron, O., and subsidiaries. Six months ended April 30: net profit, $8,149,907, equal to $4.01 each on 1,951,334 common shares, contrasted with $12,129,390, or $6.04 each on 1,950,834 shares, in the 1948 period.

Glidden Co., Cleveland, O., and subsidiaries. Six months ended April 30: net profit, $2,671,611, equal to $1.37 each on 1,782,936 common shares, contrasted with $4,071,130, or $2.19 each on 1,753,000 shares, in the corresponding period last year; net sales, $80,068,939, against $102,322,159.

Glenn L. Martin Co., Baltimore, Md. First six months, 1949: consolidated net sales, $23,032,953, against $26,688,328 in the '48 half.

(Continued on page 646)

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Anaconda Wire & Cable Co.	Com.	$0.50	July 19	July 8
Baldwin Rubber Co.	Com.	0.10 extra	July 25	July 15
	Com.	0.15 q.	July 25	July 15
Brown Rubber Co., Inc.	Com.	0.25 q.	Sept. 1	Aug. 18
Dayton Rubber Co.	Pfd. "A"	0.50 q.	July 25	July 11
Detroit Gasket & Mfg. Co.	Com.	0.12½	July 25	July 11
DeVilbiss Co.	Com.	0.12½	July 20	July 8
Dunlop Rubber Ltd.	ARD ord. reg.	0.323	July 11	May 20
Firestone Tire & Rubber Co.	Com.	1.00	July 20	July 5
General Cable Corp.	Com.	0.10	Aug. 1	July 22
Goodall Rubber Co.	Com.	0.15 q.	Aug. 15	Aug. 1
Goodyear Tire & Rubber Co.	Com.	1.25 q.	Sept. 15	Aug. 15
	Com.	1.00 q.	Sept. 15	Aug. 15
Goodyear Tire & Rubber Co. of Canada, Ltd.	Pfd.	0.50 q.	July 30	July 9
Gro-Cord Rubber Co.	Com.	0.10 q.	June 30	June 21
Johnson & Johnson	4% 2 Pfd. Ser. "A"	1.00 q.	July 20	July 15
	Com.	5% stock	Nov. 15	Oct. 25
	Com.	0.30 incr.	Sept. 12	Aug. 25
Lee Rubber & Tire Corp.	Com.	0.50 q.	Aug. 1	July 15
Link Belt Co.	Com.	1.00 q.	Sept. 1	Aug. 4
Mohawk Rubber Co.	Com.	0.25	June 30	June 11
Pharis Tire & Rubber Co.	Com.	1.50 liq.	July 26	July 18
Tyer Rubber Co.	$4.25 Pfd.	1.06¼ q.	Aug. 15	Aug. 8
Westinghouse Air Brake Co.	Com.	0.50	Aug. 1	July 15

Malayan Rubber Statistics

The following statistics for May, 1949, have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W. C. 2, England.

Ocean Shipments from Singapore and Malayan Union—In Tons

To	Sheet and Crepe: Singapore Export Proper	Sheet and Crepe: Malayan Union Trans-shipped	Sheet and Crepe: Malayan Union Direct Shipments	Latex, Concentrated Latex, and Revertex (Dry Rubber Content): Singapore Export Proper	Latex: Malayan Union Trans-shipped	Latex: Malayan Union Direct Shipments	Total All Grades Jan.-May, 1949
Argentine Republic	806	305	552	12	44	...	1,844
Australia	1,113	473	197	13	61	2	7,792
Austria	...	...	...	...	...	...	5
Belgium	330	39	745	30	3	9	4,567
Bulgaria	...	...	...	...	...	...	342
Burma	...	...	...	...	...	...	2,423
Canada	634	55	713	...	...	...	12,740
Chile	73	6	123	...	...	...	920
China	312	68	12	...	...	...	3,680
Cuba	...	...	...	...	...	...	305
Cyprus	4	...	...	...	...	...	14
Czechoslovakia	200	...	...	...	...	...	1,803
Denmark	356	185	262	3	3	...	2,198
Egypt	15	...	...	6	...	...	92
Finland	265	165	350	7	...	...	1,141
Formosa	20	...	...	...	...	...	769
France	2,287	535	3,342	60	...	66	25,487
Germany	1,953	588	2,732	100	...	92	33,494
Greece	...	...	...	1	...	...	52
Hong Kong	270	19	143	...	...	...	3,425
Hungary	...	...	50	...	...	...	85
Italy	891	351	608	...	35	...	12,667
Japan	459	...	455	...	...	...	11,532
Korea	20	...	...	...	...	...	60
Mauritius	2	...	...	...	...	...	2
Mexico	305	15	710	...	...	...	3,072
Morocco	...	...	...	...	...	...	100
Netherlands	690	160	885	47	7	...	17,352
New Zealand	317	98	80	1	25	...	868
Norway	86	10	191	11	10	6	1,760
Other British countries in Africa	...	...	...	...	...	...	1
Countries in North America	...	...	...	...	...	...	8
South America	...	...	...	...	...	...	1,066
Pakistan	...	...	...	...	...	...	5
Peru	...	...	...	...	...	...	49
Philippine Islands	...	...	...	...	...	...	31
Poland	...	...	500	30	...	...	1,776
Portugal	10	10	...	...	...	...	607
Portuguese East Africa	...	...	...	...	...	...	5
Rumania	...	...	...	...	...	...	275
Russia	...	...	...	...	...	...	32,856
Spain	...	...	...	...	...	...	1,117
Sweden	1,437	312	711	16	9	...	6,837
Switzerland	21	15	25	...	...	1	582
Syria	...	...	...	...	...	...	8
Turkey	222	25	308	...	...	...	1,253
Union of India	...	...	4	...	...	...	1,131
Union of South Africa	1,044	271	162	24	9	...	9,394
United Kingdom	3,965	1,375	5,220	784	26	119	65,181
U. S. A.	7,613	1,250	9,886	612	5	793	118,406
Yugoslavia	...	...	125	...	...	...	125
TOTAL	25,720	6,430	29,091	1,757	237	1,088	391,304

Foreign Imports of Rubber in Long Tons

Singapore Imports from	Dry Rubber	Wet Rubber (Dry Weight)
Banka and Billeton	244	...
Brunei	100	1
Burma	19	...
Dutch Borneo	185	673
French Indo-China	11	404
Java	257	...
North Borneo	1,023	61
Other countries in Asia	30	2
Dutch Islands	24	2
Rhio Residency	516	16
Sarawak	2,605	102
Sumatra	1,274	4,752
TOTAL	6,288	6,013

Federation of Malaya Imports from

Burma	349	20
Siam	665	...
Sumatra	917	103
TOTAL	1,931	123

Dealers' Stocks

Penang and Province Wellesley	10,183
Singapore	41,034
TOTAL	51,217

Port Stocks in Private Lighters and Railway Godowns

Penang and Province Wellesley	4,139
Port Swettenham	1,320
Singapore	7,535
Teluk Anson	433
TOTAL	13,427

Production

Estates	33,570
Small holdings (estimated)	18,499
TOTAL	52,069

Compounding Ingredients

Accelerator-Activators, Inorganic

Litharge, Eagle ......lb.	$0.17	/	$0.171
Red lead, Eagle ....lb.	.18		
White lead, Eagle ...lb.	.165	/	.175
Silicate, Eagle ....lb.	.1775	/	.195

Accelerator-Activators, Organic

Emersol 110 ....lb.	.13	/	.14
120 ....lb.	.135	/	.145
130 ....lb.	.1575	/	.1675
210 Elaine ....lb.	.1025	/	.125
Hyfac 430 ....lb.	.155	/	.165
431 ....lb.	.17	/	.18

Carbon Blacks

(EPC) Micronex W-6 lb.	.065	/	.1125
(HPC Micronex Mk. II ....lb.	.065	/	.1125
(MPC) Micronex Std. lb.	.065	/	.1125

Colors

Burgess Iceberg ....ton	50.00		
Vansul Blue M.B. ..lb.	.80	/	2.45
Green M.B. ......lb.	.85	/	2.25
Orange M.B. ......lb.	2.15	/	2.95
Red M.B. ....lb.	.80	/	2.45
Yellow M.B. .....lb.	.90	/	1.15

Fillers, Inert

Barytes No. 1 ......ton	34.85	/	49.65
No. 2 ....ton	32.85	/	47.65
Clay, Albacar ......ton	40.00	/	50.00
No. 1 Silica ....ton	22.00	/	40.00
SL Slate Flour ....ton	17.00	/	25.00
Whiting, Paxinosa ..ton	8.00	/	14.50

Plasticizers and Softeners

Califlux TT ....lb.	$0.02	/	$0.0275
G.B. Naphthenic Neutrals ....gal.	.11	/	.18
Pigmentar ....lb.	.035	/	.045
Pigmentaroil ....lb.	.035	/	.045

Reclaiming Oils

#3186 Reclaiming Oil gal.	.28	/	.295
Heavy Resin Oil ....lb.	.0225	/	.0375

Reinforcers, Other Than Carbon Black

Burgess Iceberg ....ton	50.00
Pigment No. 20 ..ton	35.00
No. 30 ....ton	37.00
Polyclay ....ton	45.00

Solvents

Skellysolve-E ....gal.	.153
-H ....gal.	.133
-R, -V ....gal.	.109
-S ....gal.	.099

Vulcanizing Agents

Litharge, Eagle .....lb.	.17	/	.171
Red Lead, Eagle ....lb.	.18		
White lead silicate, Eagle ....lb.	.1775	/	.195

Financial

(*Continued from page 644*)

General Electric Co., Schenectady, N. Y., and consolidated affiliates. First half, 1949: net income, $46,552,842, equal to $1.61 a common share, contrasted with $54,602,339, or $1.89 a share, in the corresponding period of the previous year; consolidated net sales, $801,756,516, against $772,761,792; provision for federal taxes, $34,000,000, against $45,000,000.

Monsanto Chemical Co., St. Louis, Mo., and subsidiaries, excluding British and Australian ones. Six months ended June 30: net income, $7,989,858, equal to $1.72 each on 4,275,589 common shares, contrasted with $7,926,759, or $1.73 each on 4,272,531 shares, in the corresponding period of 1948; net sales, $79,347,108, against $78,739,148.

Plymouth Rubber Co., Inc., Canton, Mass. Six months to May 31: net income, $108,813 or 12¢ each on 900,000 shares, against $155,981, or 17¢ a share, in the 1948 period.

Rohm & Haas Co., Philadelphia, Pa. First half, 1949: net profit, $2,140,080, equal to $2.62 each on 769,229 common shares, contrasted with $2,446,000, or $3.02 a share, in the corresponding period of 1948; sales, $31,043,000, against $31,887,000.

Viceroy Mfg. Co., Ltd., Toronto, Ont. Year ended February 28, 1949: net profit, $146,235, equal to $1.24 each on 118,192 common shares, against $132,368, or $1.12 a share, for the preceding fiscal year.

Westinghouse Air Brake Co., Wilmerding, Pa., and subsidiaries. June quarter: net profit, $3,294,227, equal to $1.04 a share, compared with $4,136,887, or $1.30 a share, a year earlier.

S. S. White Dental Mfg. Co., Philadelphia, Pa., and subsidiaries. First quarter, 1949: net profit, $320,135, equal to $1.07 each on 298,918 capital shares, against $264,866, or 88¢ each on 298,898 shares, a year ago; sales, $5,184,407, against $4,620,061; reserve for income taxes, $246,028, against $203,230.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

Effective July 1, 1947

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.25 per line (ten words)	Light face type 40c per line (ten words)	Light face type $1.00 per line (ten words)
Bold face type $1.60 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.40 per line (eight words)
Allow nine words for keyed address.	**Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.**	*Letter replies forwarded without charge, but no packages or samples.*

SITUATIONS OPEN

PLASTIC ENGINEER WANTED: MECHANICAL ENGINEER preferred. Must have experience on molding of clutch facings, mold design, and plant operation. Give full résumé of experience, references, and salary desired. Address Box No. 396, care of INDIA RUBBER WORLD.

FACTORY FOREMAN WANTED BY PROGRESSIVE MANUFACturer located in Connecticut to supervise the manufacture of rubber and plastic baby pants, crib sheets, and rubber sundries. Good salary and wonderful opportunity for a man who is capable. State experience and salary desired in replying. Address Box No. 397, care of INDIA RUBBER WORLD.

CANVAS AND RUBBER FOOTWEAR: EXCELLENT OPPORtunity to achieve key position in newly established plant located in Southern California. Openings for stitching room, making room, and mill room men, also pattern maker. All must be thoroughly familiar with the latest methods. State full information in first letter, indicating salary expected. All applications kept confidential. Address Box No. 398, care of INDIA RUBBER WORLD.

TECHNICAL SALES: NEW PLANT LOCATED IN SOUTHERN California has opening for aggressive sales manager for molded goods division. Must be experienced, be prepared to take charge of sales, development of new products, and be familiar with the manufacturing process. State full details and expected salary. All replies treated confidentially. Address Box No. 399, care of INDIA RUBBER WORLD.

WANTED: CALENDER OPERATOR EXPERIENCED IN COMpounding and applying natural and synthetic rubber tank-lining stock. Send full details in first reply. Address Box No. 405, care of INDIA RUBBER WORLD.

NEEDED: GENERAL FOREMAN TO TAKE CHARGE OF OUR expanding molded goods department. Company is located in Middle West. Give details of experience and qualifications. Address Box No. 407, care of INDIA RUBBER WORLD.

WANTED: RUBBER CHEMIST WITH EXPERIENCE IN DEvelopment and production of rubber heels, soles, and soling sheets. Plant located in Eastern United States is equipped with modern laboratory. Extrafine association with university trained management and staff offers you a most congenial atmosphere. Write, giving age, education, experience and salary you will accept at the start. Replies will be held in strictest confidence. Address Box No. 408, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

WANTED TO LEASE—SMALL PLANT EQUIPPED MILLS AND calender, or space in larger plant, for non-competitive product. Low labor cost area essential. Address Box No. 401, care of INDIA RUBBER WORLD.

RUBBER TECHNOLOGIST—DESIRES TO PURCHASE INTEREST in small plant needing capital to expand. Location east of Mississippi. Object working partner. Address Box No. 402, care of INDIA RUBBER WORLD.

SITUATIONS WANTED

ENGLISHMAN (41) SEEKS POST WITH AMERICAN OR CANAdian manufacturers. For past 20 years has held a series of high executive posts with group of leading rubber and plastic manufacturers in England and for the last six years has been vice president of the group. Has traveled widely throughout Europe and the States and has a wide knowledge of manufacturing and production technique. He has many high qualifications and is well known in industrial circles in England.

For some years has specialized in research and the study of really economic production and administration within the factory. Is seeking an executive post of real responsibility involving hard work—alternatively is prepared to act in a consultative capacity on certain predetermined lines. Full details will be airmailed in confidence upon request. Address Box No. 400, care of INDIA RUBBER WORLD.

SUPERINTENDENT—CHEMIST, NOW EMPLOYED, DESIRES new connection. Twenty years of broad practical experience manufacturing mechanical and sponge rubber goods in large and small plants. Location in Middle or Far West desired. Address Box No. 409, care of INDIA RUBBER WORLD.

MACHINERY AND SUPPLIES WANTED

WANTED—USED 40"-48" RUBBER MILL WITH REDUCER, motor, brake, and starter. LEBANON BALL CO., 340 S. 7th St., Lebanon, Pa.

WANTED: COMPLETE RUBBER PLANTS, ALSO INDIVIDUAL items such as 2-roll mills, calenders, mixers and Banbury mixers. Address Box No. 406, care of INDIA RUBBER WORLD.

WANTED: ONE USED LABORATORY HYDRAULIC PRESS TO hold 20" x 20" plates. One laboratory mill. Address Box No. 410, care of INDIA RUBBER WORLD.

MACHINERY & SUPPLIES FOR SALE

FOR SALE: 1—WATSON STILLMAN LOW AND HIGH HYDRO-Pneumatic Accumulator (3000#) pressure with pumps, motors, and accessories. 1—48 x 48" 3-opening Hydraulic Press with 4-16" rams; other presses, various sizes. 1—6' x 24' Vulcanizer, 100# pressure, quick-opening door. 6 Royle and other Tubers 2⅛ to 8". Also mills, calenders, etc. Send us your inquiries. CONSOLIDATED PRODUCTS CO., INC., 13-16 PARK ROW, NEW YORK 7, NEW YORK. Telephone BArclay 7-0600.

FOR SALE: 8 X 3 THROPP LAB. MILL IN GOOD CONDITION, cost $1,239.00—will take $650.00. 2½ Royle Tuber with wire crosshead, no drive, cheap; two 200-ton 16" ram presses, one 70-ton press, no platens. Address Box No. 404, care of INDIA RUBBER WORLD.

STOKES ROTARY 16-PUNCH PELLET PRESSES, HEAVY-DUTY double-arm jacketed mixers 15 gal., 25 gal., 100 gal., 250 gal. PERRY EQUIPMENT CORP., 1524 W. Thompson St., Phila. 21, Pa.

READY, COMPLETELY REBUILT #9 BANBURY MIXER BODies, spray or jacketed, to exchange with you for worn bodies and save time. All sizes rebuilt to order. INTERSTATE WELDING SERVICE, 914 Miami Street, Akron 11, Ohio.

(Classified Advertisements Continued on Page 648)

OUR NEW MACHINERY
HYDRAULIC PRESSES
CUTTERS—LAB. MILLS
BRAKES—LIFT TABLES
MILLS—MIXERS
SUSAN GRINDERS

NEW MACHINERY REBUILT

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2—DISASSEMBLY
3—REBUILDING
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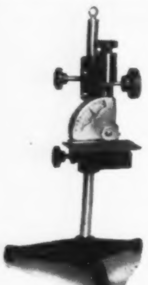
COAST-TO-COAST
TRENTON, N. J.—MAIN OFFICE



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CLASSIFIED ADVERTISEMENTS

Continued

MACHINERY & SUPPLIES FOR SALE (Cont'd)

FOR SALE: FARREL 18" X 45", 16" X 48", 15" X 36" 2-ROLL RUBber Mills, also new Lab. 6" x 12" & other sizes up to 84"; Rubber Calenders; Extruders 2" to 6"; Ball & Jewell Rotary Cutters 40 HP & 5 HP; Baker Perkins 200-gal. & 100-gal. double-arm, jack. Mixers, also 9 and lab. 0.7 gals.; Large stock Hydraulic Presses from 12" x 12" to 42" x 48" platens, from 50 to 1500 tons; Hydraulic Pumps & Accumulators; Injection Molding Machines 1 to 16 oz.; Stokes & Colton single punch & rotary preform Tablet Machines, ½" to 2½"; Banbury Mixer; Grinders & Crushers, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT COMPANY, 90 WEST STREET, NEW YORK 6, N. Y.

FOR SALE: HEAVY-DUTY CALENDER, ESPECIALLY BUILT. Heavy-duty frames, 24 x 40 rolls, 18" bearings. Fine for Vinylite and plastics with usual combinations. D.C. motor with own generator. Latest controls from 1 yd. to 33 yds. per minute. Located West Coast. Address Box No. 403, care of INDIA RUBBER WORLD.

WANTED — Large engineering firm wishes to acquire several complete Rubber Plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment, whole or in part. Personnel retained where possible, strictest confidence. Box 1220, 1474 Broadway, New York 18, N. Y.

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WANTED

RUBBER PRODUCTS PATENTS desired: large national mechanical Manufacturer: confidential. Complete details first letter.

Address Box No. 341, care of INDIA RUBBER WORLD.

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• Write for information and prices.

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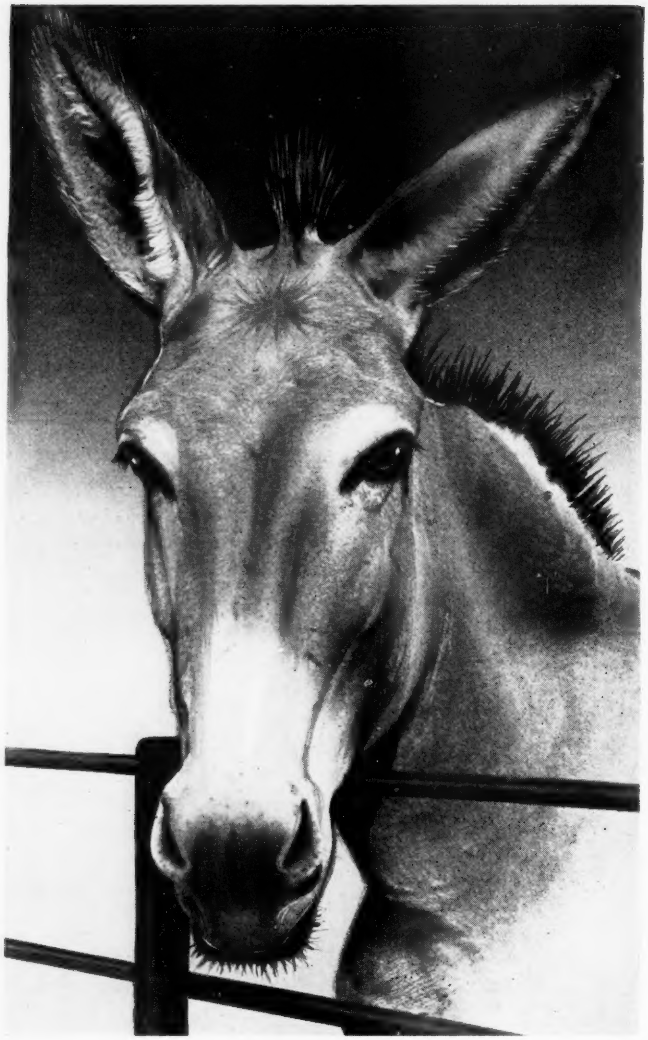

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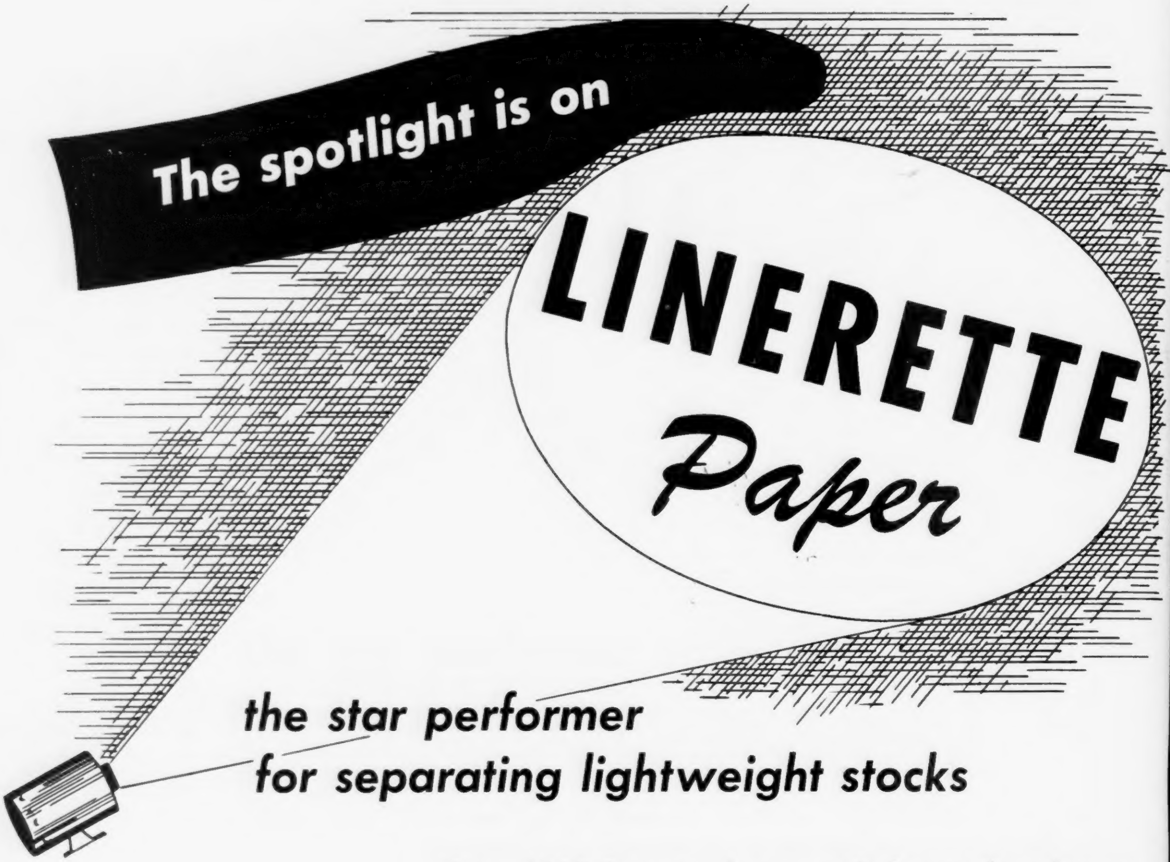

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